#254 3/31/83

FAO Fisheries Report No. 254 FIP/R 254(En)

INDIAN OCEAN FISHERY COMMISSION (IOFC)

Report of the first session of the

COMMITTEE FOR THE DEVELOPMENT AND MANAGEMENT OF FISHERIES IN THE SOUTHWEST INDIAN OCEAN

Le Chaland, Mauritius, 22-24 April 1981

LIBRARY
NATIONAL MARINE FISHERIES SERVICE
HONOLULU LABORATORY
P. O. BOX 3830
HONOLULU, HAWAII 96812

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

INDIAN OCEAN FISHERY COMMISSION (IOFC)

REPORT

of the

FIRST SESSION OF THE

COMMITTEE FOR THE DEVELOPMENT AND MANAGEMENT
OF FISHERIES IN THE SOUTHWEST INDIAN OCEAN

Le Chaland, Mauritius, 22-24 April 1981

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome 1981

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

M-43

ISBN 92-5-101097-8

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior permission of the copyright owner. Applications for such permission, with a statement of the purpose and extent of the reproduction, should be addressed to the Director, Publications Division, Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy.

© FAO 1981

PREPARATION OF THIS REPORT

This is the final version of the report as approved by the first session of the IOFC Committee for the Development and Management of Fisheries in the Southwest Indian Ocean.

Distribution

Participants in the session
Members of the Committee
Other interested nations and
international organizations
FAO Fisheries Department
Fishery Officers in FAO Regional Offices

For bibliographic purposes this document should be cited as follows:

Indian Ocean Fishery Commission Committee for
1981 the Development and Management of Fisheries in the southwest Indian Ocean, Report of the first session of the Committee for the development and management of fisheries in the southwest Indian Ocean. Le Chaland, Mauritius, 22-24 April 1981. FAO Fish.Rep., (254):58 p.

ABSTRACT

The final formal report of the first session of the Indian Ocean Fishery Commission (IOFC), Committee for the Development and Management of Fisheries in the Southwest Indian Ocean, held in Le Chaland, Mauritius, from 22 to 24 April 1981 is presented. Major topics were a review of the fisheries development in the region, future activities to support fisheries administration and management and the establishment of a regional project for the development and management of the fisheries.

A list of the recommendations of the session is included as Appendix G.

CONTENTS

	Paragraphs
OPENING OF THE SESSION	1 - 3
ELECTION OF CHAIRMAN AND VICE-CHAIRMAN	4
ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION	5
FISHERIES DEVELOPMENT IN THE SOUTHWEST INDIAN OCEAN REGION	6 - 33
(a) Coastal fisheries	6 - 25
(i) Information on the stocks	6 - 11
(ii) Status of fisheries, constraints and opportunities for development	12 - 25
(b) Tuna	26 - 33
SUPPORT FOR FISHERIES ADMINISTRATION AND MANAGEMENT	34 - 48
THE FAO COMPREHENSIVE PROGRAMME OF ASSISTANCE IN THE DEVELOPMENT AND MANAGEMENT OF FISHERIES IN ECONOMIC ZONES (EEZ) IN THE REGION, AND PROGRESS REPORT ON THE ESTABLISHMENT OF THE TECHNICAL SUPPORT UNIT	49 - 63
ANY OTHER MATTERS	64 - 67
(a) Intersessional activities	64 - 66
(b) Activities or related projects	67
DATE AND PLACE OF THE SECOND SESSION	68
ELECTION OF OFFICERS	69
ADOPTION OF THE REPORT	70

		Page
Appendix A	List of participants	13
B	Address by The Honourable I. Seetaram, M.L.A., Minister of Fisheries and Cooperatives and Cooperative Development, Mauritius	17
C	Address by Mr Kenneth C. Lucas, Assistant Director-General (Fisheries Department), FAO	19
D	Agenda	21
E	List of documents	23
F	National Report on Fisheries Management and Development, Secretariat of State for Fisheries, People's Republic of Mozambique	25
G	Summary of recommendations for action	29
H	Review of fisheries development in the southwest Indian Ocean region	33
I	Support for fisheries administration and management	49

OPENING OF THE SESSION

1. The Committee for the Development and Management of Fisheries in the Southwest Indian Ocean of the Indian Ocean Fishery Commission (IOFC) held its first session on 22-24 April 1981 at Le Chaland Hotel, Mauritius. The session was attended by six member countries of the Committee and representatives from the United Nations Development Programme and the European Economic Community.

2. A list of participants is given in Appendix A of this report.

3. The session was officially opened by the Honourable Iswardeo Seetaram, Minister of Fisheries and Co-operatives and Co-operative Development of Mauritius. Mr Kenneth C. Lucas, Assistant Director-General (Fisheries Department) of FAO, also addressed the meeting at the opening session. Their statements are given in Appendixes B and C of this report.

ELECTION OF CHAIRMAN AND VICE-CHAIRMAN

4. The Committee elected Mr David Ardill of Mauritius and Mr Norbert Odero of Kenya as Chairman and Vice-Chairman, respectively of this session.

ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION

5. The Committee considered the provisional agenda submitted in document IOFC: DM/SW/81/1, and adopted the Agenda as given in Appendix D with agreement that intersessional activities could be discussed under item 7. The documents which were before the Committee are listed in Appendix E.

FISHERIES DEVELOPMENT IN THE SOUTHWEST INDIAN OCEAN REGION

(a) Coastal fisheries

(i) Information on the stocks

6. In introducing this item (see document IOFC:DM/SW/81/4) the Secretariat noted that the information presented was far from complete and that the various delegations should add and correct information where necessary. Statistics indicate that the total marine catches in the area were roughly 166 000 t in 1979, against a total of 354 000 t of freshwater fish produced by the Member States. Exact figures of captures by foreign fleets were not known. It was noted that the reported statistics were not totally reliable, with identifiable overestimates in at least one country and possible underestimates in others. Landings of crustaceans were relatively high (around 12 000 t), while those of pelagic fish and molluscs were low. The quantities of tuna reported as landed by the coastal states were probably also overestimated. Considering the size of the area, total marine fish production was very low.

7. The potential of the various resources had been assessed through surveys (trawl and acoustic) and by comparing grounds with a known production with similar areas. The number of surveys had not been very large and data for the comparative studies, carried out in a workshop held in 1978 in the Seychelles, were also limited. The tentative figures indicate a potential of more than 500 000 t of small pelagic fish, of which 50 percent is located in north Somalia and another substantial part in the region of the Oceanic Islands (Mahé Plateau, Saya de Malha, etc.). The potential of demersal fish is around 280 000 t, of which 25 percent is located in north Somalia and some 30 percent in the plateaux of the Oceanic Islands. Penaeid shrimp catches were close to their maximum but some patches of deep sea crustaceans could still be exploited. When comparing the reported landings with the estimated potential yields it was evident that landings could be increased considerably off Somalia and the oceanic banks, while those in certain other areas might be doubled. The feasibility of harvesting mesopelagic fish in the Gulf of Aden was to be studied in a special project by states bordering the North Arabian Sea.

8. Most delegates pointed out that accurate statistics formed one of the foundations of fisheries development. Although the resource surveys provided useful information on the overall availability of fish resources, it was also noted that these quantities were often spread over a wide area and that fishable concentrations were not always found easily. The total amount of fisheries information, including catch and effort statistics as well as economic data would need to be vastly improved in the Southwest Indian Ocean region.

9. One delegation pointed out that not only fish resources, but also fishermen were not evenly distributed over the area, with the result that areas near their villages were over-exploited, while others remained untouched.

10. Several delegations provided new information, not contained in the document. In Mozambique, Soviet trawlers under a joint venture started the exploration of a stock of scads discovered during a survey of the R/V DR FRIDTJOF NANSEN in 1978. In fact, 7 000 to 8 000 t were caught mainly by bottom trawl. Deep-sea lobster (Palinurus delagoa) was discovered by a Soviet vessel in 1976, and 2 to 3 trawlers were fishing this resource. However, in 1979 a Japanese vessel attempting to catch crabs at 300-800 m depth made catches in the order of 1 t/day of mainly adult lobsters in their pots. This compares to 300-400 kg/day by the trawlers. For this particular species therefore pots proved to be more effective and less damaging to the environment than trawls.

11. In Reunion, economically interesting catches were obtained of deep sea shrimp (Heterocarpus sp.) at 800-1 000 m depth using pots for their capture. Papers with further details of deep sea crustacea surveys and the special gear used were in preparation and the delegate of France advised that they could be made available upon request of other member countries. The French delegate further informed the Committee that a research cruise for deep sea resources will be carried out from 15 June to 19 July 1982 by the R/V MARION DUFRESNE within 100 mi around Reunion. The scientists of other countries who would be interested in this type of research are cordially invited to contact the French representative of Reunion.

(ii) Status of fisheries, constraints and opportunities for development

12. The second part of document IOFC:DM/SW/81/4 described the main features related to the status of fisheries and identified the constraints and opportunities for development. With regard to the status of fisheries and relevant constraints, the lack of information, in particular on small-scale fisheries, was stressed. In this respect, it was suggested that more effort should be made by national fisheries officers and technologists for collecting more comprehensive information in this field, as a basis for planning future development actions. Another major constraint was noted as being the present distribution of catch where the road network was limited.

13. As for the opportunities for fisheries development, presented in the last part of the document, it was made clear that the numerous actions proposed for fisheries upgrading were all highly desirable, but the selection of priorities was left to the judgement of the governments which should take into account their specific conditions and needs.

14. The Committee expressed appreciation for the approach and presentation by FAO of the problems of fisheries development. A detailed discussion was held on the main issues of the document related to the following aspects: artisanal fisheries, test fishing, boat design and construction, regional fisheries technology servicing, training and extension services, comparative and experimental fishing, use of by-catch and aquaculture.

15. The upgrading of artisanal fisheries was considered an essential objective of fisheries development by most delegates. The delegate of Mozambique informed the Committee of the effort undertaken by his country, with the assistance of the Mozambique Nordic Agricultural Programme (MONAP) and FAO, for the promotion of small-scale fisheries through the establishment of several integrated fisheries complexes, grouping the most urgently required facilities and including the eseential technical and managerial support (e.g. fisheries technology and extension service units). The delegate of Madagascar described the activities

related to the development of improved fishing craft and gear for artisanal fisheries, complemented by the establishment of several centres with ice production and transport facilities.

16. The delegate of Kenya mentioned a World Bank project for the improvement of boats and fish utilization for artisanal fishermen's communities located far from the important urban centres. The delegate of Mauritius provided information on the actions for the promotion of the livelihood of small-scale fishermen, in particular by means of the establishment of integrated cooperative complexes ("Maisons de pêcheurs"), including such aspects as credit facilities, fish storage, distribution and marketing, workshops for boat and engine repair, together with on-the-job training of fishermen in new techniques.

17. Several delegates pointed out that soundly managed artisanal fisheries for coastal stocks were preferable to introduction of industrial fisheries in coastal areas. One delegate noted that a new catching technique for deep-water shrimp (Heterocarpus sp.), developed off Reunion, was probably applicable to small-scale fisheries (pot fishing at short distance from the coast) in other areas of the region.

18. There was a general agreement among the participants that test fishing, i.e., practically oriented, experimental/exploratory fishing, should receive special attention for fisheries development planning in the whole region. Test fishing was considered essential for the definition of suitable catching techniques, selection of vessel type and size, identification of available resources on unexploited fishing grounds, and assessment of profitability, in particular with a view toward possible future investments. The Committee recommended that test fishing activities be planned and conducted in the area on a regional basis. Arrangements for use of the catch taken during test fishing operations should be made (e.g. marketing and distribution) in order to avoid discarding fish.

19. Several delegates noted that there was a general need for the improvement of small boat design and construction with a view to increasing their seaworthiness and operational range to cope with the relatively rough sea conditions throughout many areas of the region. The use of new materials for boat construction was also considered important by several countries, subject to their acceptance by the fishermen and suitability to local fishing conditions. An interest in developing multipurpose fishing vessels for diversifying fishing operations and catches was expressed by several delegations. In relation to boat design, the importance of fuel savings during operations through such innovations as the adoption of auxiliary sail power, was stressed.

20. The delegate of Mozambique called the attention of the Committee to the possibility of establishing a Regional Fisheries Technology Unit which could be responsible for promoting and coordinating test fishing activities within the region. Such a unit could also encourage the transfer of technology within and outside the region, and promote the upgrading of national capacities in this subject.

21. The importance of training, in particular for seagoing personnel, e.g. skippers, mechanics, fishery scientists and fisheries observers, was pointed out by several delegates. The difficulties encountered for training national fishermen on board foreign vessels in accordance with bilateral agreements were described. The delegate of Mozambique informed the Committee of the results obtained by the fishermen's training centre, created with the assistance of UNDP and FAO, as an urgent measure to ensure the operation of the national shrimp trawler fleet. Extension services including practical on-the-job training, and information and demonstration activities were considered essential by several delegates for upgrading fishing and fish processing techniques in small-scale fisheries.

22. One method of obtaining data on catch rates and fishing areas was to place trained observers on licensed foreign vessels operating in the area. Several countries (Mauritius, Mozambique, Seychelles and Somalia) had applied this system, but several difficulties had been encountered, e.g., communication problems, accommodation, language problems and food customs, as well as a general lack of adequate training of the observers. Often there was not enough staff for this work in the region. It was generally felt that the observers had not been as effective as expected.

23. Several delegates informed the Committee of the results of the work accomplished in their respective countries from experimental fishing projects. The delegate of Seychelles described the important work undertaken for the determination of catch rates by seasons and using various types of trawls (midwater, bottom, one or two-boat operated).

24. The delegate of Kenya mentioned that it was desirable that licensed foreign vessels operating within the region should be prohibited from discarding their by-catch, as this fish should be used for human consumption in the countries of the region.

25. Several delegations expressed an interest in promoting development of coastal aquaculture and mariculture to supplement marine production. The work of the FAO Regional Aquaculture Training Centre in Nigeria was mentioned, and the Secretariat advised that the Committee could quite properly address aquaculture development issues in the region. The possibility of bait fish culture, where local supplies were not sufficient, was mentioned. However, the delegate of Seychelles indicated that consideration regarding the performance of cultured species as pole-and-line bait often made culture not justifiable. The Committee was informed of the success in culturing green turtles in Reunion.

(b) Tuna

26. The section on tuna of document IOFC:DM/SW/81/4 and various information documents, were introduced separately by the Secretariat. Tuna supports the major industrial fishery in the region, mainly carried out by longline fleets from eastern Asia. Catches of non-local countries amounted to 41 000 t in 1977, several times higher than in previous years. Landings of tuna by local fleets were given as nearly 15 000 t in FAO's statistics, but this figure was thought to be an overestimate, due possibly in part to double reporting. Recent developments in the area included the operation of a purse seiner by Mauritius, pole-and-line fishing in the Seychelles, combined recently with purse seining of schools attracted by bait near the pole-and-line vessel, and two new longliners in Kenya. A once successful pole-and-line fishery in Madagascar had not operated since 1975 after 11 000 t had been caught in 1974. The foreign fleets were mainly concentrating on the larger tunas, and the catch rates in this fishery have dropped considerably in recent years, indicating economic overfishing and quite possibly depletion of the stocks.

27. The IOFC at its sixth session had strongly endorsed recommendations of the sixth joint meeting of the IOFC Committee on Management of Indian Ocean Tuna and the IPFC Special Committee on Management of Indo-Pacific Tuna. The FAO/UNDP Project for Tuna Management in the Indian and Pacific Oceans, staffed with two experts in statistics and programme analysis, will be based in Colombo, Sri Lanka, and is expected to become operational in the next few months. Collection of statistics from all Indian Ocean and Western Pacific tuna fisheries, and processing and storage of data will be the principal activities of this project. Member countries will be asked to ensure full supply of information by all tuna vessels operating in their EEZs.

28. The charter of a Japanese pole-and-line tuna research vessel for thirty months to map the occurrence of surface tuna and to test their catchability, as well as the supply of bait, was planned as part of a regional tuna project for which funding was being sought from UNDP and Japan. A preliminary programme to carry out tagging programmes in the South China Sea area and to prepare a design for the survey of the Indian Ocean had already been set up with Japanese funds. The Committee asked to be kept fully informed of the activities of these projects. A common logbook, based on designs already used in the South Pacific and in the Atlantic regions will be introduced in the Indian Ocean by the regional tuna project.

29. Several delegates expressed their concern about the relatively optimistic assessments of the stocks in certain areas, in view of the fact that tunas are probably not as highly migratory as it has always been assumed. The possibility of overfishing of local stocks should therefore not be excluded. The delegate of Kenya supplied the following data on the operation of the two new longliners: after an initial catch rate of 0.5 t/day the daily rate had increased to 2 to 3 t/day and a total of 180 t had been landed in two trips, which were marketed at US$ 1 300/t. The training of local fishermen was the biggest problem.

30. It was reported that licensing of foreign tuna fleets was practised in the Seychelles, where 100 Korean vessels were operating during last season. A logbook was presented at the end of the season by many vessels. France had an agreement with Japan for fishing within the French EEZ in the Indian Ocean, but not with other countries. Other member countries of the Committee did not yet apply a licensing requirement on foreign fishery vessels. The delegate of Mauritius drew attention to the possibility of gradually enforcing a change in the foreign fleet's activities and a reduction in fishing effort by setting licence fees at such a level as to be economic only for those vessels capable of producing the highly valuable product for the "sashimi" market.

31. One delegate advised that the stock size needed to be established before deciding on the number of licences that could be issued in the region. Other delegates were of the opinion that it was better to start the licence system even though all information was not yet available for management decisions. It was also noted that in several countries reports on catches stopped as soon as EEZs had been declared.

32. Issues of tuna management were discussed. The IOFC Committee on Management of Indian Ocean Tuna had the direct responsibility for tuna management issues in the Indian Ocean region. It was noted, however, that the Committee would play a leading role in tuna development activities in the Southwest Indian Ocean region, and as a channel of communication on tuna fisheries management matters to the Management Committee and the regional tuna project.

Development aspects

33. The Committee discussed the possibility of using alternative catching techniques for surface tuna such as fish-aggregating devices and drifting nets, which appeared of particular interest to small-scale or semi-industrial fisheries. The worldwide growing interest in fish-aggregating devices for tuna, confirmed by the preliminary results of FAO projects for the development of this technique in the South Pacific and in the Maldives, demonstrated the possible application to selected areas in the region. The use of drifting gillnets, already successfully used on a commercial basis in many places in tropical waters, e.g., in Sri Lanka with 10-12 m vessels and in Ghana with large canoes, could also be tried in suitable areas of this region.

SUPPORT FOR FISHERIES ADMINISTRATION AND MANAGEMENT

34. The Committee considered this item on the basis of document IOFC:DM/SW/81/5. In introducing the item the Secretariat explained that the document attempted to review the needs and capabilities in fishery research, development, management, training and administration in the countries of the region. The relatively low level of technical competence in various key fields in fisheries, the lack of knowledge on the resources, the lack of appropriate technology, inadequate administrative support and lack of necessary infrastructure were considered to be the main constraints to further fisheries development. This information supplemented by national statements, and consideration of the specific role to be played by a proposed regional project for this region, provided the basis for discussion on the priority tasks which should be assigned to FAO and the Regional Project for the Development and Management of Fisheries in the Southwest Indian Ocean.

35. The Committee expressed its satisfaction with the supporting document for this item and noted the comprehensive research, development and management responsibilities delegated to it in the Southwest Indian Ocean region. It was emphasized that, in considering this and the following item of the agenda, the Committee should bear in mind the need for identifying urgent tasks and priority actions in view of its comprehensive responsibilities in the region.

36. Delegations presented, in turn, statements on problems and progress at the national level with particular reference to issues which should be dealt with through regional cooperative action.

(i) France

37. Fisheries research work undertaken by France in the Indian Ocean is concerned mainly with the stocks currently exploited by the fisheries of Reunion or on potential stocks. In the artisanal fisheries sector exploratory work is continuing on the deep-water crustacea resource and the preliminary results are available. Concerning the offshore stocks, a study of emperors (Lethrinus enignatus) on the banks of Saya de Malha is being undertaken, and France would like to cooperate with those countries exploiting this resource. The Southern Islands fisheries are of deepest interest for the distant water fisheries of France, but little is known about them. A comprehensive research programme is planned and in addition France hopes to carry out a detailed study of the migrations of the tuna populations presently exploited by the coastal fisheries of Reunion. France recognizes the urgent need of cooperating with FAO programmes in the Region.

(ii) Kenya

38. An important problem was the lack of highly skilled personnel in research work and in other aspects of fisheries management, and hence the Government is setting up a Wildlife and Fisheries Training Institute in cooperation with the World Bank to train government and private sector personnel. The Kenyan delegation felt the need for cooperative action within the Southwest Indian Ocean region in research, training, management and development of fisheries.

(iii) Madagascar

39. Traditional fisheries predominate in Madagascar; however, there are also some industrial fisheries. Government policy is to upgrade the traditional (small-scale) fisheries by introduction of improved gear, provision of credit, improvement of vessels and infrastructure and training of technicians. There are opportunities to expand the shrimp fisheries and it is hoped also to establish a tuna fishery. Priorities include development of better and multipurpose boats for the artisanal fisheries, rationalizing the industrial fisheries, strengthening of research capabilities, expansion of technicians training at Majonga Institute and improvement of the fisheries legislation. Madagascar would like to work with other countries of the region on developing appropriate systems of monitoring control and surveillance of fisheries, especially for control of foreign vessels.

(iv) Mauritius

40. Coastal fisheries are fully exploited and the more distant "banks" fishery will need to be expanded to increase fish supplies to help meet growing national needs. Priority areas for action include establishment of fishermen marketing cooperatives and credit schemes, training of artisanal fishermen in engine and gear maintenance and in better fishing and processing methods, improving catching methods for skipjack, development of offshore resources around Rodrigues Island, exploitation of scad resources, expansion of aquaculture, promoting exports of surface tuna species, expanding activities in test fishing, negotiating licensing agreements with foreign fishing nations, expansion of production of freshwater prawn, encouragement of sport fishing and a controlled collection of ornamental fishes. Mauritius looks to developing regional cooperation in licensing and managing the tuna fisheries in the Southwest Indian Ocean, as well as in developing a regional system of monitoring, control and surveillance.

41. The main problems encountered in Mauritius concern the lack of adequate data on fish stocks, the need for licensing of tuna fishing, better monitoring and enforcement, protection of marine environment from oil pollution and from overexploitation of sand resources.

(v) Mozambique

42. The delegation of Mozambique tabled a prepared statement on this item which is included as Appendix F to this report. Among the highest priorities for action were strengthening of the fishery administration, research and development on underexploited resources, improvement of fishing techniques, increase in the exploitation of scads to reduce reliance on

fish imports and expansion of training schemes for artisanal fishermen. The establishment of a regional data base was proposed with the necessary support for the treatment and analysis of the information, having in mind the need to review the models and methods presently used and adapt them to the prevailing tropical conditions in the region. The necessity for a regional approach to test fishing and appraisal of developed activities was also emphasized.

43. Major problems encountered are the small capacity of the fishery administration for extension work, the lack of students having the appropriate background who are available for training, the difficulty of obtaining proper maintenance of fishing equipment and the need for upgrading fisheries legislation and strengthening control and surveillance capacity.

(vi) Seychelles

44. Artisanal fisheries are very important in Seychelles and produce some 5 500 t of production annually. Offshore fisheries produce another 8 000 t annually. Per caput consumption of fish is extremely high and fish is the main source of protein for the population. The Fisheries Division is still in an embryonic stage of development and does not yet have capacity to provide adequate training of fishermen though this is being taken into consideration and appropriate plans are being developed. Research activities on demersal, pelagic and bait fish stocks and gear techniques are being conducted by this Division. Seychelles has a special interest and need in monitoring, control and surveillance of her extensive EEZ and is desirous of seeing the Committee take an early initiative in developing a regional approach to this problem.

45. Of highest priority for the future is the desire to upgrade traditional fisheries to a semi-industrial level through improving fishing techniques and introducing multipurpose vessels. There is also a desire to take specific measures to derive maximum benefit from the foreign tuna fisheries and eventually displace them with a domestic based tuna fishery. Tuna fisheries development must be approached on a comprehensive basis including test fishing, gear development, training, processing and marketing.

46. All delegations expressed their strong interest for a concerted regional approach to the many aspects of fisheries development and management which were discussed. The Committee urged region-wide action, especially on surveys and assessment of specific resources; development of improved statistics; test fishing; monitoring, control and surveillance; training of fishermen, experts and administrators and harmonization of legislation.

47. The Committee examined specific requirements and priorities for developing and managing their fisheries, and identified the following listing as being the highest priorities for the region:

(i) Formulation of development programmes for the upgrading of artisanal fisheries through improvement of vessels, gear, handling, preservation and marketing.

(ii) Conduct of test fishing and surveys on specific resources and development of improved stock assessment methods suited to tropical fish populations.

(iii) Training of fisheries technicians and administrators as well as those engaged in small-scale fisheries under local conditions through the development of regional training programmes.

(iv) Development of a strong fisheries data base at both the national and regional levels with the assistance of the regional programme and exchange of information - scientific, technological, statistical and commercial - throughout the region. The possibility of the project producing a regional newsletter should be explored.

(v) Development of improved systems of monitoring, control and surveillance of the fisheries were needed at both the national and regional level, and legislation needed to be improved and harmonized among member countries.

(vi) The tuna fisheries of the region should be developed for the maximum benefit of the member countries.

48. Most delegations stressed the challenges and opportunities engendered by the new regime of the sea. The assistance already received from FAO was acknowledged and the need for further advice and assistance from FAO and the proposed regional project in particular was emphasized. Urgent attention was needed to establish effective monitoring, control and surveillance of the exclusive economic zones of the members. The delegate of Seychelles advised of his country's proposal to host a seminar in cooperation with FAO to examine this important issue. The Secretariat advised of actions now being pursued by FAO on this subject. An Expert Consultation on Monitoring, Control and Surveillance will be held in Rome from 27 to 30 April 1981 which will generate a body of basic knowledge on the present experience in many parts of the world to enable the Organization to begin to offer concrete and practicable advice to its members. A full-time officer has been recruited by FAO in Rome to coordinate assistance in monitoring, control and surveillance, and the next step envisaged following next week's consultation will be workshops and seminars at the regional level. Thus the Seychelles proposal was felt to be most timely and the Committee recommended that FAO and the regional project work with the Seychelles Government to arrange the proposed seminar/workshop in early 1982.

THE FAO COMPREHENSIVE PROGRAMME OF ASSISTANCE IN THE DEVELOPMENT AND MANAGEMENT OF FISHERIES IN ECONOMIC ZONES (EEZ) IN THE REGION, AND PROGRESS REPORT ON THE ESTABLISHMENT OF THE TECHNICAL SUPPORT UNIT

49. Before the discussions on the UNDP/FAO Regional Project for the Development and Management of Fisheries in the Southwest Indian Ocean started, the Assistant Director-General (Fisheries Department) of FAO, recalled that in addition to its specific objectives, the proposed regional project will have general objectives that are common with other regional projects that FAO is already operating or is about to implement in other regions of the world.

The general objectives of these projects are to:

- strengthen the capabilities of the coastal countries and groupings of countries to manage and develop their fisheries,

- promote rational management and the full use by the developing countries of fishery resources in their economic zones,

- strengthen the efforts of developing countries to secure a greater share of and higher benefit from living marine resources as part of initiative to establish a New International Economic Order.

50. In order to achieve these objectives a medium-term action plan as well as long-term studies will be undertaken. Medium-term activities will include the preparation of fisheries policies and plans; advisory services on specific questions such as resource assessment, fishing technology, fish marketing; elaboration of national legislations, training of administrators; mobilizing funds; and promotion of collaboration in fisheries development and management through regional bodies and programmes.

51. More than twenty EEZ policy and planning missions have now been undertaken by FAO at the request of developing coastal states in order to review country situations, identify national objectives and determine alternative strategies to achieve these objectives.

52. Assistance in fisheries legislation within the context of exclusive economic zones has been provided by the establishment of regional fisheries law advisory programmes for the Eastern Central Atlantic, the Western Central Atlantic, the Indian Ocean and the South China Sea/Western Pacific regions. The intention will be to locate the regional law adviser for the Indian Ocean with the Southwest Indian Ocean Regional Programme staff in the Seychelles.

53. Longer term studies are to formulate principles and methods for the development and management of fisheries in economic zones. Further progress in this respect has among other things been made on the world appraisal of fishery resources on a region-by-region basis. Various valuable manuals and technical papers have been published or will soon be issued by FAO. The revised World Fisheries Atlas will be available within a few weeks. A World Conference on Fisheries Development and Management is planned by FAO for May 1983 in Rome.

54. High priority is now being given to the review of the experience available and the development of concepts and technologies of fisheries monitoring, control and surveillance for the use of these coastal states requiring assistance in establishing or improving their own systems of control over fishing activities in exclusive economic zones.

55. Under a UNDP-funded global research programme co-financed by NORAD, the R/V FRIDTJOF NANSEN is being used for resource surveys with acoustic instruments and fishing gear (shrimp, bottom, midwater trawls, longlines). The Committee may wish to submit a request for specific research programmes in the area for the coming years, which could be taken into consideration in the overall cruise plans for the vessel.

Under the same UNDP programme a manual will be prepared on the assessment of fish stocks in untrawlable areas (coral reefs, etc.).

56. Proposals have been submitted to UNDP for a regional EEZ training project which will prepare training materials and course plans aimed at administrators as well as experts for use at the regional and national levels. Provision for conduct of seminars and workshops has been included in this programme.

57. The Organization is now implementing a worldwide network of sub-regional technical support units associated with regional fishery bodies. Donors with a long tradition of collaboration with FAO such as the UNDP and the Nordic countries have favourably responded to the calls for extra-budgetary support to the EEZ Programme.

58. Since 1979, extra-budgetary support to the FAO/EEZ Programme by Norway, for example, has exceeded US$ 5-7 million. These and other extra-budgetary funds totalling US$ 43 million have been devoted to regional and other programmes related to EEZ-assisted programmes in West Africa, the Wider Caribbean, the South China Sea, South Pacific, Bay of Bengal and Red Sea areas.

Regional Project for the Development and Management of Fisheries in the Southwest Indian Ocean

59. At its sixth session held in Perth, Australia, in February 1980, the Indian Ocean Fishery Commission resolved to create a subregional committee for fishery management and development in the Southwest Indian Ocean. The Commission further recommended that a technical support unit be also established through extra-budgetary funding to facilitate the work of the new Committee in:

(1) compiling data on stocks and catches;

(2) evaluating the state of the stocks;

(3) assisting member countries in developing fisheries management programmes;

(4) providing support for developing the fisheries of the region, and

(5) training and upgrading the skills of all in the region engaged in fisheries management and development.

60. A preparatory project of US$ 184 980 (RAF 79/065) was elaborated by FAO and approved by UNDP in 1980 for implementation to commence in 1981, with the primary purpose to improve the capacity of each country in the area to elaborate and implement dynamic policies of development and management of the fisheries. This preparatory project, which includes only 26 man-months of experts, is to be followed by a larger project of five years duration whose purpose will be to give the Southwest Indian Ocean Fishery Committee the full technical support it will require for executing its programme of development and management of the fisheries of the region. The final elaboration of this project will follow the decisions on priorities taken at this first meeting of the Committee for the Development and Management of Fisheries in the Southwest Indian Ocean. The size of the programme will depend on final budgetary decisions of the UNDP Regional Programme for Africa.

61. A tentative programme of activities of the project had been prepared by FAO and this will now have to be reviewed and a new document will have to be elaborated to reflect the recommendations of the Committee, which include among its priorities:

(1) improvement of national capabilities in managing and exploiting the fisheries;

(2) upgrading of artisanal fisheries from catch to marketing;

(3) improvement of member countries' capacity to collect and improve statistics, and

(4) assistance to test fishing programmes to determine fisheries development opportunities in the region and to manage associated data collection and analysis programmes.

62. The project will be headquartered in the Seychelles and in addition to the Programme Leader it should be served by at least three experts who would be specialists in resources with development planning capability, statistics and small-scale fisheries development respectively.

63. The Committee received these proposals with appreciation and commended FAO and UNDP on the initiatives they have so far taken. It was recommended that FAO should draft the project and continue with their consultations with the member countries and UNDP on the basis of these conclusions.

ANY OTHER MATTERS

(a) Inter-sessional Activities

64. The Committee recommended the setting-up of two working parties to undertake inter-sessional work. The following terms of reference were suggested by the Secretariat:

(i) Working Party on Small-scale Fisheries Development

Its main terms of reference would include advice on upgrading of traditional/artisanal fisheries through improvement of catching, handling and processing techniques; development of national extension services: identification of training needs; development of fishermen organizations; development of credit facilities; and improvement and standardization of fishing gear, equipment and vessels.

(ii) Working Party on Fisheries Management and Administration

Its main terms of reference would include identification of training needs for administrators, experts and observers; development of monitoring control and surveillance systems for the region; development of a regional data base; improvement of statistics, and resource issues.

65. The Committee emphasized that these working parties should focus on specific issues within their frame of reference and in close cooperation with the regional project. During the forthcoming intersessional period it was recommended that the issues to be examined in depth be chosen from the following short list:

- how the proposed test fishing activities should be conducted to the greatest benefit of small-scale fisheries development;
- conduct a detailed review of the crustacea resources and fisheries of the region and identify opportunities for development;
- prepare for and conduct, with the support of FAO Rome-based staff, a regional seminar on monitoring, control and surveillance of fishery activities in the region;
- upgrading of traditional/artisanal fisheries through employment of catching, handling and processing techniques.

66. The final selection of topics to be dealt with was left to the Secretariat, who will consult with the member countries of the Committee before taking definitive action on this recommendation.

(b) Activities or Related Projects

67. The Committee was informed of the activities of the Agence de Coopération Culturelle et Technique (ACCT) in freshwater aquaculture, mariculture and marine environmental protection in the Comores and Mascarene Islands. The need for close collaboration of this work with the regional programme of the Committee was emphasized.

DATE AND PLACE OF THE SECOND SESSION

68. The Committee received with appreciation an invitation by the delegate of Seychelles to hold the second session of the Committee in Seychelles in 1982. The exact date and place of the session will be decided by the Director-General in consultation with the Chairman and the authorities of the host country.

ELECTION OF OFFICERS

69. The Committee elected Seychelles and Mozambique as Chairman and Vice-Chairman, respectively to serve until the end of the second session.

ADOPTION OF THE REPORT

70. This report was adopted by the Committee on 24 April 1981.

APPENDIX A

List of participants

MEMBERS OF THE COMMITTEE

France

Kopp, J.
Attaché de recherches
Chef du Laboratoire
Institut Scientifique et Technique des Pêches Maritimes
La Réunion

Kenya

Odero, N.
Director of Fisheries
Ministry of Environment and Natural Resources
P.O. Box 58187
Nairobi

Nzioka, R.M.
Research Officer
Kenya Marine and Fisheries Research Institute
P.O. Box 81651
Mombasa

Madagascar

Rahoray, D.
Chargé d'affaires
Ambassade de la République démocratique de Madagascar
Avenue Queen Mary
Floréal
Mauritius

Andriamiarisatrana, Ms Florette
Chef du Service de Production Animale
Ministère du Développement Rural et de la Réforme Agraire
B.P. 291
Antananarivo

Andrianaivojaona, C.
Chef de la Division Pêches Maritimes
Ministère du Développement Rural et de la Réforme Agraire
Antananarivo

Sylla, Jocelyne
Attaché Commercial
Ambassade de la République démocratique de Madagascar
Avenue Queen Mary
Floréal
Mauritius

Mauritius

Ardill, D.
Divisional Scientific Officer (Fisheries)
Ministry of Fisheries and Co-operatives and Co-operative Development
Port Louis

Padayachy, P.
Permanent Secretary
Ministry of Fisheries and Co-operatives and Co-operative Development
Registrar General's Building
Port Louis

Beegun, Ms K.
Administrative Officer
Prime Minister's Office
Port Louis

Goorah, D.
Scientific Officer
Ministry of Fisheries and Co-operatives and Co-operative Development
Registrar General's Building
Port Louis

Gunessee, S.
Second Secretary
Ministry of External Affairs
Port Louis

Jehingeer, M.I.
Scientific Officer
Ministry of Fisheries and Co-operatives and Co-operative Development
Registrar General's Building
Port Louis

Nakhuda, A.H.
Senior Economist
Ministry of Economic Planning and Development
Port Louis

Mozambique

Silva, R.
Head of Department
Department of Fishery Resources
Fishery Development Institute
C.P. 1723
Maputo

Seychelles

Samsoodin, W.
Directeur de Pêches Maritimes
P.O. Box 471
Mahé

Harris, A.
Fisheries Research Officer
Fisheries Division
Ministry of Agriculture
Mahé

Somalia

Tanzania

REPRESENTATIVE OF A UNITED NATIONS SPECIALIZED AGENCY

United Nations Development Programme

Schellenberg, J.P.
UNDP Resident Representative
Anglo-Mauritius Building
Port Louis
Mauritius

EUROPEAN ECONOMIC COMMUNITY

Brizio, E.
EEC Delegate to Mauritius
EEC Delegation
B.P. 10
Vacoas
Mauritius

Corre, J.-M.
Consultant to the EEC Delegation in Mauritius
EEC Delegation
B.P. 10
Vacoas
Mauritius

FAO

Regional Office for Africa

West, W.Q.-B.
Regional Fisheries Officer
FAO Regional Office for Africa
P.O. Box 1628
Accra, Ghana

Headquarters

Lucas, K.C.
Assistant Director-General (Fisheries)
Fisheries Department
FAO
Via delle Terme di Caracalla
00100 Rome
Italy

Kambona, J.J.
Chief, International Institutions and Liaison Unit
Fishery Policy and Planning Division
Fisheries Department
FAO
Via delle Terme di Caracalla
00100 Rome
Italy

Aubray, R.
Senior Project Operations Officer
Operations Service
Fisheries Department
FAO
Via delle Terme di Caracalla
00100 Rome
Italy

Nédélec, C.
Fishery Industry Officer
(Gear and Fishing Technology)
Fisheries Technology Service
Fishery Industries Division
Fisheries Department
FAO
Via delle Terme di Caracalla
00100 Rome
Italy

Venema, S.C.
Fishery Resources Officer
Marine Resources Service
Fishery Resources and Environment Division
Fisheries Department
FAO
Via delle Terme di Caracalla
00100 Rome
Italy

CHAIRMAN OF THE COMMITTEE AT ITS FIRST SESSION

D. Ardill (Mauritius)

SECRETARIAT

Host Government

Liaison Officer	K. Lollbeeharry
Assisted by	F. Bhankaranlly Mrs L.C. Chong Shin Sen A. Ruyub Miss S. Atchia Miss G.J. Ramtoolah Miss D. Matabudul S. Perianen C. Choolun A. Khundoo P. Buthun
Coordinators	B. Veerasamy (Administrative) C.R. Semboo (Scientific)

FAO

Secretary of the Committee	J.J. Kambona
Meetings Assistant	Luisa Almagià
Translator	Maryse Virahsawmy
Interpreters	R. Frank V. Currimjee C. Mariotte M.L. Pavlidis

APPENDIX B

Address by The Honourable I. Seetaram, M.L.A., Minister of Fisheries and Cooperatives and Cooperative Development, Mauritius

Honourable Ministers, Mr Lucas, Distinguished Delegates, Ladies and Gentlemen,

It gives me great pleasure on behalf of the Mauritian Government to welcome to Mauritius the distinguished delegates and FAO officials from overseas, and also to welcome all present at the inaugural meeting of the First Session of the Committee for the Development and Management of the Fisheries of the Southwest Indian Ocean, organized by the Indian Ocean Fisheries Commission of FAO.

We consider it a great honour, indeed, that Mauritius has been chosen to host the first meeting of this Committee. As would naturally be expected from an island nation, the Mauritian people place a great importance on the sea and on fisheries. Several thousand people derive their livelihood directly from the sea - as fishermen, or in the processing and marketing of the catch, or in boatbuilding and allied disciplines. In addition, it is estimated that some 70 000 people engage in fishing as a leisure-time activity.

The progression in the consumption of fish in Mauritius has been quite spectacular, rising from 7 kg per person in 1969 to some 18 kg per person today. Fish represents over 40 percent of the animal protein consumed by the population of this island, and in Rodrigues, where the per caput consumption is about 50 kg a year, the total animal protein requirements are met from this source.

The policy of the Mauritius Government is to increase the consumption of fish to a level where at least 50 percent of the protein requirements will be met from fish. At present, 60 percent of our fish requirements are imported, at a cost of some 50 million rupees, after deduction of earnings from fishery exports.

An increase in the production of fish is therefore considered by the Mauritius Government to be of primary importance for our economy, as it will reduce our dependence on imports and boost export of high value products like crustaceans and canned tuna. Moreover, it will help in the struggle against unemployment by the creation of new jobs, and the redeployment of fishermen from the overexploited artisanal fishery. There is no doubt that similar development in the other countries of our region will bring about manifold benefits for those countries.

With the increasing complexity of fisheries development and management, and the increasing tendency to exploit far-ranging stocks of fish, it is becoming evident that a small developing country cannot achieve much on its own. The same problems confronting the countries of our region are faced by most developing countries in other regions also.

The Indian Ocean Fishery Commission and the Indian Ocean Project, which have been of sterling service in the development of fisheries in the Indian Ocean, have found it difficult to respond to the needs of specific sub-regions. These organizations have so far been able to concentrate their efforts only on the richer areas and on the major problems of the Indian Ocean. The decision of the Indian Ocean Fisheries Commission to create sub-regional committees, backed up by technical support projects, of which the Southwest Indian Ocean Committee is one, is therefore highly appreciated by the countries of the sub-region.

I am confident that this Committee will have an extremely positive influence on the development and the management of fisheries in our region. The drastic reduction in distances to be travelled by participants and the direct interest of all participants in the problems to be discussed will, no doubt, ensure full participation in the deliberations

of the Committee. The ensuing improvement in dialogue between neighbouring countries will ensure that the fishery resources of the region are used in a rational manner by the countries of the region for the benefit of the people of the region.

I am sure that the high level of expertise present at this meeting will give the administrators of all the Governments of this region, as well as the FAO, guidelines for cooperative action which will lead to the expansion of all our national fisheries.

I should like to express our heartfelt thanks to the FAO for the profound interest it is taking in our problems. I should also like to thank all those who have been of precious help in the organization of this meeting. I also wish all the delegates and officials from overseas a pleasant stay in our island.

Distinguished Delegates, I wish you the greatest success in your deliberations, and have now great pleasure in declaring open the First Session of the Committee for Development and Management of the Fisheries of the Southwest Indian Ocean.

APPENDIX C

Address by Mr Kenneth C. Lucas, Assistant Director-General (Fisheries Department), FAO

Mr Chairman, Mr Minister, Distinguished Delegates and Observers, Ladies and Gentlemen,

I would like first of all to extend on behalf of the Director-General of the Food and Agriculture Organization, Dr Edouard Saouma, and on behalf of the delegates to this First Session of the Committee for the Development and Management of Fisheries in the Southwest Indian Ocean, our sincere thanks to the Government of Mauritius for enabling us to hold this meeting here in Le Chaland. The excellent facilities and warm welcome provided augur well for a successful session. I would also like to thank the Mauritius Organizing Committee for their thorough preparations and for making each of us feel at home and at ease in your beautiful country.

At its last session in Perth, Australia, in 1980, the Indian Ocean Fishery Commission made important decisions regarding its mode of operation and structure, decisions which will enable the countries of the region to take a more active role in fisheries management, development and cooperation and which will enable them to more effectively respond to the new situation arising from the changes in the Law of the Sea and the establishment of exclusive economic zones.

Indeed, the developments in the Law of the Sea have opened up new vistas to the coastal countries - new opportunities and greater responsibilities for rational management and conservation of fisheries and the need for cooperative action in regard to these new opportunities and responsibilities, especially where shared stocks and fisheries are concerned. The establishment of this Committee and of similar ones for the Bay of Bengal and the Gulfs is a reflection of the determination of the Indian Ocean Fishery Commission and its member countries to respond promptly and effectively to this new situation.

The first meeting of your Committee is being held at a time when important and far-reaching changes are taking place in world fisheries. While final agreement on a new convention at the Third United Nations Conference on the Law of the Sea is still being worked out, the jurisdiction of coastal states over the fishery resources off their shores has already become accepted in practice. Five members of your Committee have declared exclusive economic zones of 200 miles, one member has extended jurisdiction over 200 miles of territorial waters and another to 50 miles.

There is thus now not only a more secure basis for effective "husbandry" of the resources but the responsibility for management is now firmly in your hands acting either individually or collectively. Here is a unique opportunity to ensure that the most beneficial use is made of the fish stocks and at the same time ensure that these resources are effectively managed.

We have a full agenda ahead of us and I will try not to delay proceedings with a lengthy address. Allow me just to call your attention to the three substantive items on the agenda.

Agenda item 4 deals with the state of fisheries development in the Southwest Indian Ocean region. Here we will be concerned with a review of the present status of marine fisheries and have the chance to discuss opportunities and constraints for further exploitation of the resources, to decide what further work on assessment and management needs to be done, and what are development needs.

Under agenda item 5 there will be an opportunity to review and decide on priorities, especially with respect to regional cooperation and the future activities of the Southwest Indian Ocean technical support unit. In this context it will be opportune to review the national institutions present in the region and the possibilities of utilizing them as

vehicles for bringing about further development. I hope that the discussions will recognize the need for a fuller participation of small-scale fishermen and their communities in the uses of the resources of the sea and will lay a firm foundation for a greater participation of the coastal countries in the exploitation of the offshore resources.

It is the role and responsibility of FAO to provide the best possible help to developing nations in the complex and difficult tasks they face in developing and managing the fish resources of their economic zones. To this end, the Organization has established a special programme of assistance - the EEZ programme - whose scope and activities will be reported under item 6 of the agenda along with a full review of the associated regional development and management programme proposed under UNDP funding over the next five years.

In planning and implementing this programme, a central FAO policy is to strengthen and adapt the network of FAO regional fishery bodies, so as to enable member countries to play a more effective role in their activities, to promote national and regional collective self-reliance and generally assist in realizing the aims of the new international economic order.

We also believe that this programme of assistance must be delivered in a decentralized manner if we are to provide a prompt and effective response to the needs of our member nations. The basic medium of that decentralization is the technical support unit - a locally-based team of experts in various disciplines, living and working in the field, fully familiar with local situations and changes in situations. Our plan is to place teams of this type in specific, natural management areas across the world's oceans.

Let me explain that term. By a natural management area we mean an area where a group of countries share sea resources, have similar or common fisheries problems and opportunities or have other social and economic interests in common. They are groupings, so to speak, that need to work together, are natural cooperators and would mutually benefit from such cooperation. The Southwest Indian Ocean region is one such area.

Each of these areas, I repeat, would be served by its resident team of experts, guided by an intergovernmental body such as this Committee.

This strategy, which has received the blessing of the FAO Committee on Fisheries and the FAO Conference, is already being vigorously implemented. We expect, eventually, to see about 15 sub-regional Committees around the world, each supported by a technical assistance unit.

The work of your technical support unit, for which the UNDP has already provided the core funding for the preparatory phase, will be launched in the next few months. As I mentioned, agenda item 6 will focus on this programme and I look forward to hearing the comments and advice of the delegations concerning the future conduct of the programme. Since we will be discussing technical cooperation and mutual assistance we have invited three funding agencies, UNDP, EEC and ACCT to take part in our deliberations.

Although this Committee is composed of countries of different sizes, at various levels of development, they share one common desire - that is the desire to cooperate and to benefit mutually from that cooperation in the management and development of their fisheries. We are here to explore the various ways of cooperating in this region such as pooling efforts in such things as research, establishing a regional data base, resource surveys, training or increasing of trade between the countries of the region. Through such joint efforts the countries of the region can master the technical, social and economic problems facing them more quickly and successfully. We in FAO are available to assist, if you would like our help.

I wish you every success in your endeavours and assure you of FAO's support for your efforts.

Thank you, Mr Chairman.

APPENDIX D

Agenda

1. Opening of the session
2. Election of Chairman and Vice-Chairman
3. Adoption of the agenda and arrangements for the session
4. Fisheries development in the Southwest Indian Ocean region
   (a) Coastal fisheries
   (b) Tuna
5. Support for fisheries administration and management
6. The FAO comprehensive programme of assistance in the development and management of fisheries in economic zones (EEZ) in the region and progress report on the establishment of the technical support unit
7. Any other matters
   (a) Inter-sessional activities
   (b) Activities or related projects
8. Date and place of the next session
9. Election of officers
10. Adoption of the report

APPENDIX E

List of Documents

IOFC:DM/SW/81/1	Provisional agenda
2	Annotated provisional agenda
3	Provisional timetable
4	Review of fisheries development in the Southwest Indian Ocean region
5	Support for fisheries administration and management
6	FAO/UNDP Regional Fisheries Development and Management Project for Southwest Indian Ocean
IOFC:DM/SW/81/Inf.1	List of documents
2	Information for participants
3	List of delegates and observers
4	Report of the sixth session of the Indian Ocean Fishery Commission, Perth, Australia, 25-29 February 1980
5	Report of the sixth joint meeting of the IOFC Committee on Management of Indian Ocean Tuna (7th session) and the IPFC Special Committee on Management of Indo-Pacific Tuna (6th session), Perth, Australia, 20-22 February 1980
6	Indian Ocean, Western and Eastern (Major Fishing Areas 51 and 57) - nominal catches by countries and species, 1973-79
7	Extracts from the report of the eleventh FAO Regional Conference for Africa dealing with fisheries, Lomé, Togo, 16-27 June 1980
8	Report of the Workshop on the Assessment of Selected Tunas and Billfish Stocks in the Pacific and Indian Oceans, Shimizu, Japan, 13-22 June 1979
9	Options for management of tuna in the Indian Ocean and Western Pacific

APPENDIX F

National Report on Fisheries Management and Development

Secretariat of State for Fisheries
People's Republic of Mozambique

1. BACKGROUND

At the time of National Independence, on 25 June 1975, the only fishery that had begun to develop was the shallow-water shrimping still in a very splitted organization and high diversity of production means.

An extensive action was since then overtaken aiming at adjusting this fishery to the national objectives: to link the revenue arising from export goods to meet the domestic protein requirements. This action included the maintenance of the fleet, the assessment of the resources, the setting of projects for the improvement of shore facilities as well as the organization of a state company for the centralized trade of fish products.

Surveys arranged under bilateral agreements as well as within international programmes were conducted over the EEZ early legislated which led to a preliminary assessment of the main offshore resources' potentials.

As a result of the resource appraisal reached, experimental fisheries started to exploit oceanic stocks and joint ventures were organized to undertake the use of resources for which there were no national capabilities.

The growth of this sector became so evident that in 1978 a central board was created to direct it: the Secretariat of State for Fisheries.

2. THE FISHERIES ADMINISTRATION

The quick development of fishery activities in several fronts issued a framework of a number of state companies charged of resource exploitation, fishing equipment distribution and manufacturing, headed by "Units of Direction" - a kind of "holding" companies which centralize the direction and planning of production activities and its economics. Meanwhile the fish trade companies entered the frame of the respective Internal and External Trade Ministries.

At present there is a Unit of Direction for the Development of Small-scale Fisheries and another for the Industrial Fisheries. The latter participates not only in the direction of national companies but also in the joint ventures.

Besides these executive bodies an Institute for Fisheries Development was established in order to prepare for the fisheries administration all the basic studies and information on resource potential and level of exploitation - upon which resource management is based - technological issues both for catching and post-harvest systems, as well as the economic evaluation of development projects.

Having in mind that Mozambique's economy is centrally directed one understands that fisheries management just like development prospects take place at the higher direction level where national capacity is evaluated together with the recommendations issued by the Institute's activities.

3. FISHERIES DEVELOPMENT POLICY

The experience already gained in four years of resource use and infrastructure organization allowed the fisheries administration to perform a medium-term planning integrated in a global economy development plan for ten years.

The objectives set for the fisheries sector are to exploit at full the major part of the assessed resources by 1990. This will lead to a situation of autosufficiency in fish products for direct consumption, together with an important income in convertible currency by the export of valuable goods like prawns and lobsters.

For the Small-scale Fisheries, development is meant as a substitution of the present subsistence and local marketing activities by a system where improved technology increases inshore and fresh-water catches within a framework of companies centrally directed.

Both for these fisheries and for the industrial sector it is foreseen that development issues will eradicate from regional complexes, state owned, combining the fleet's management with a network of facilities for equipment distribution, landing sites with good collecting and processing capacity, ship and engine repairs, backed by units of the Institute which gather data from resource management and provide technological advice and extension. In rural areas these complexes could run fish-culture units connected with agricultural activities.

The settlement of fishing complexes will be closely linked to the development goals set at the region or province.

4. THE ROLE OF INTERNATIONAL/BILATERAL PROJECTS

Foreign capacity greatly contributed to the maturation of this policy, either providing the means to assess potential resources, helping identify the bottlenecks and respective solutions for immediate and short-term actions, or preparing projects for international/bilateral funding of development objectives.

Besides a sum of bilateral programme which contributed to the present knowledge of the resources and the respective methods of exploitation, there are two main projects worth describing: MOZ/77/001 (UNDP) - Marine Fisheries Training and Development.

This project has as principal component the settlement of a training centre for fishermen; after the exodus of expatriate personnel who ran the shrimp fleet an emergency plan was set to substitute them by nationals with adequate education and this centre was the first answer to this plan. The National Training Centre for Fishermen already formed two batches of seamen to become after some years' practice masterfishermen and engineers. The centre is presently preparing a wider range of curricula to train other specialities (gear, processing technology, etc.) as well as to improve the theoretical background of existing seamen of different levels, injecting at the same time a technological input.

In the field of fisheries development this project gives support to activities which led to the present capacity in resource management and in technological approach. Consultants of high standard have contributed to the definition of a research growth strategy, helped select and make use of methodology to issue the first recommendations for resource management, evaluated the type of fishing vessel used in marine fisheries and the way it could be improved.

Initially this project was designed for a two-year period, but very recently it was extended for a period of five years which allows that the preliminary steps of the development policy identified be followed by the necessary evaluation.

MONAP/FAO - FI-1 Development of Inland and Inshore Fisheries

With the support of the Nordic countries' fund for agriculture development this project began in 1979 by the identification of perspectives of inland water fishing possibilities, and was at the end of 1980 expanded to include in its activities the inshore sector, for these fisheries both suffer from the same level of problems and should have the same treatment.

This three-year project is starting the basic research and collection of data together with experimental fishing and extension in selected areas. It will as well participate in the financing and assisting the building of infrastructures for the small-scale sector.

Under the supervision of international experts, teams of biologists, fishing technologists and fish culturists composed of foreign technicians with large practice in African or at least in countries with the same characteristics and whenever possible national counterparts conduct a complex of development activities in selected areas covered by the project.

There are four components: (i) fishing technology as a backstopping to small-scale companies or cooperatives, (ii) research, in the sense of productivity and resource appraisal, (iii) reactivation of existing fish culture stations with the selection of the adequate methods and species, and (iv) training activities in general (but special attention is given to fish culture training to agriculture trainees).

Priority was assigned to the Nyassa Lake and the Cahora Bassa Dam, the largest inland water bodies. Holothurians, shrimps and algae were selected as inshore resources to be surveyed in the first phase. Since the "Headquarters" of the project are in Maputo, many tasks will be run in the neighbourhood, considering all the components.

New projects were identified and were recently approved to be funded by the IPF (UN). One of them will be an extension of aquaculture activities mainly connected with agriculture development. Another project will deal with the establishment of a quality control system for fish products; the quality of prawns for export is a preoccupation of the authorities since long and a laboratory for bacteriological and chemical analyses is already installed as well as the training of field technologists, but the full system remains to be settled (other products for domestic use will also be covered by the system).

5. PROSPECTS FOR REGIONAL COOPERATION

The diversity of the resources and activities and the already established capacity for research and intervention in development give the People's Republic of Mozambique the possibility of joining in projects of cooperation in conditions of real participation.

Nevertheless some aspects still hamper the national capacity of involvement in new projects: (i) imports are strictly planned and gathering equipment for a new activity sometimes takes one year or more, and (ii) the output of trained personnel is small and thus strictly distributed. This is a situation that only global development will change and for which foreign aid has brought but immediate solutions.

Although - as it is stated in the development project now proposed - many problems remain to be identified, there are some fields in which Mozambique should be glad to participate on a basis of regional cooperation.

1. Exchange of scientific information - the promotion of regional meetings and joint studies on subjects of which complementary research is conducted in several countries is probably one of the most feasible tasks to be assigned to a regional coordination body.

2. EEZ surveillance - in Mozambique there are two areas where the shelf is too wide to be carefully controlled by the existing capacity (the areas are the Sofala Bank and the Delagoa Bight). Having in mind that other countries in the region may have the same problem, this item seems to be worth considering in regional programmes.

3. Tuna fishery development - exploratory surveys have already located the areas and species within Mozambique's EEZ with good prospects for tuna fishing; still in the experiments undertaken an important proportion of catches is composed of sharks. As these products have a lower price an economical problem arises when considering the development of this fishery. Could the same problem be identified in the region, this should be a matter of study under a regional programme.

APPENDIX G

Summary of Recommendations for Action

Item 4. Fisheries Development in the Southwest Indian Ocean region

(a) Coastal Fisheries

For attention of FAO

1.	Assist the region in improving fisheries information, including catch and effort statistics as well as economic data	(paragraph 8)
2.	Encourage upgrading of traditional fisheries and transfer of fishing technology within the region	(paragraphs 15, 20 and 21)
3.	Promote and organize (demonstration) test fishing activities on a regional basis	(paragraph 18)
4.	Investigate the possibility of improving small boat designs in the region, in order to improve their seaworthiness and operational range and to cope with the rough seas found in the region. Also, investigate the introduction of new materials for boat construction and their suitability to local conditions and acceptance by the local fishermen	(paragraph 19)
5.	Assist the region in promoting development of coastal aquaculture and mariculture to supplement marine production	(paragraph 25)

For attention of Governments

1.	Cooperate in generating accurate statistics and improving fisheries information in particular on small-scale fisheries	(paragraphs 8 and 12)
2.	Make efforts to select priorities for the development of coastal small-scale fisheries within existing social patterns	(paragraphs 13 and 15)
3.	Step up plans and strategies in test fishing, i.e., practically oriented; experimental/exploratory fishing should receive special attention for fisheries development planning in the whole region	(paragraph 18)
4.	Intensify training of indigenous personnel at all levels in fisheries sector	(paragraph 21)
5.	Make effort to encourage licensed foreign vessels in the region to deliver their bycatch to the countries to be used for human consumption	(paragraph 24)

(b) Tuna

For attention of FAO

1.	Keep Committee fully informed on the activities of FAO tuna survey and assessment programme in the Indian and South Pacific Oceans	(paragraph 28)
2.	Assist the countries in training their fishermen to enable them to take part in the tuna fishery	(paragraph 29)

3. Intensify the role of the Committee in tuna development activities in the Southwest Indian Ocean region and as a channel of communication on tuna fisheries management matters to the IOFC Tuna Management Committee (paragraph 32)

4. Assist the countries in developing alternative catching techniques for surface tunas (paragraph 33)

For attention of Governments

1. Cooperate in supplying information to the FAO/UNDP Project for Tuna Management in the Indian and Pacific Oceans concerning all tuna fishing operating in their EEZs (paragraph 29)

2. Intensify training of fishermen (paragraph 29)

Item 5. Support for Fisheries Administration and Management

For attention of FAO

1. Assist in fostering regional cooperative action especially in planning and conducting surveys and assessment of specific resources, development of improved statistics, test fishing, monitoring, control and surveillance, training of fishermen, experts and administrators and harmonization of legislation (paragraph 46)

2. Take note and facilitate the implementation of a regional programme consisting of the following priorities: (paragraph 47)

   (i) Formulation of development programmes for the upgrading of artisanal fisheries through improvement of fishing craft, gear and operations, fish handling, preservation and marketing

   (ii) Conduct of test fishing and resource surveys on specific resources and development of improved stock assessment methods suited to tropical fish populations

   (iii) Training of fisheries technicians and administrators as well as those engaged in small-scale fisheries under local conditions through the development of regional training programmes

   (iv) Development of a strong fisheries data base at both the national and regional levels with the assistance of the regional programme and exchange of information - scientific, technological, statistical and commercial - throughout the region. The possibility of the project producing a regional newsletter should be explored

   (v) Development of improved systems of monitoring, control and surveillance of the fisheries were needed at both the national and regional level, and legislation needed to be improved and harmonized among member countries

   (vi) Development of the tuna fisheries of the region to maximize the benefits of the members of the region

3. Organize a Regional Seminar/Workshop in cooperation with the Government of the Seychelles on Fisheries Monitoring, Control and Surveillance in the region (paragraph 48)

For attention of Governments

1. Intensify regional cooperative action in research, training, management and development of fisheries (paragraphs 38 and 46)

2. Cooperate in developing appropriate system of monitoring, control and surveillance of fisheries, especially for control of foreign vessels (paragraphs 30, 40, 42 and 44)

3. Evolve better systems for monitoring and enforcement and protection of marine environment (paragraph 41)

4. Cooperate in establishing a regional data base, for the treatment and analysis of information (paragraph 42)

5. Strengthen cooperation in upgrading traditional fisheries to a semi-industrial level through improving fishing techniques and the introduction of multipurpose vessels (paragraph 45)

Item 6. The FAO Comprehensive Programme of Assistance in the Development and Management of Fisheries in Economic Zones (EEZ) and progress report on the establishment of the Technical Support Unit

For attention of FAO

1. Draft the regional project RAF/79/065 taking full cognizance of the priorities of the region (paragraphs 60, 61 and 62)

Item 7. Any other matters

For attention of FAO

1. Establish two working parties:

   (i) Working Party on Small-scale Fisheries Development

   (ii) Working Party on Fisheries Management and Administration (paragraph 64)

2. Select from the following list issues to be dealt with by the Working Parties during the inter-sessional period: (paragraph 65)

   - how the proposed test fishing activities should be conducted to the greatest benefit of small-scale fisheries development;

   - conduct a detailed review of the crustacea resources and fisheries of the region and identify opportunities for development;

   - prepare for and conduct, with the support of FAO Rome-based staff, a regional seminar on monitoring, control and surveillance of fishery activities in the region;

   - upgrading of traditional/artisanal fisheries through employment of catching, handling and processing techniques.

APPENDIX H

REVIEW OF FISHERIES DEVELOPMENT IN THE SOUTHWEST INDIAN OCEAN REGION

Summary

The paper describes the status of the fisheries in the area on the basis of available information. The resources are not well known but seem to offer some opportunities for further development for the countries of the area. Apart from tuna and shrimp, the fishery is mostly artisanal and would benefit from technical improvements and upgrading to more fully utilize the resources available. Major opportunities appear to be limited, but some countries with pelagics - both coastal and oceanic (tuna) - stocks could increase their national participation in the exploitation of these stocks. The management of a number of fisheries - shrimp, tuna, small-scale inshore fisheries in various sectors, etc. - is of increasing importance.

INTRODUCTION

1. The purpose of this paper is to review the status of the fisheries in the Southwest Indian Ocean on the basis of available information. First a review of the resources available to the countries of the region within their exclusive economic zones and an appreciation of their potential are made. A second step is an evaluation of the state of exploitation complete with details on the catching, processing, utilization and marketing in various kinds of fisheries: artisanal, semi-industrial and industrial. This information, coupled with existing data on demand for the region, will give a clearer picture on development opportunities offered by fisheries in the region, constraints facing the countries to capitalize on these resources and management requirements. This review will serve as a take-off point for the second substantive paper of the Committee entitled "Support for fisheries administration and management" (IOFC:DM/SW/81/5), and as a basis for discussion by the Committee on major development and management issues and priorities for action.

2. As background information, it is recalled that the nine countries of the Southwest Indian Ocean (Comoros, Kenya, Madagascar, Mauritius, Mozambique, Reunion (France), Seychelles, Somalia and Tanzania) have altogether a population in excess of 55 million and a land surface of 3.5 million km^2. Projections show that by 1990 total population will exceed 70 million. The countries are poor, with an average GNP *per caput* of US$ 700 (ranging from US$ 130 - Somalia to US$ 3 060 - Reunion). More than 70 percent of the total labour force is in agriculture which generates less than 40 percent of the region's income. Nutritional levels, in terms of *per caput* calorie and protein intake, is under minimum requirements in several areas.

3. This paper deals with the marine fisheries of the region. It is realized that in Madagascar, Kenya and Tanzania the importance of inland fisheries far exceeds that of the marine fisheries. *Per caput* fish consumption figures, to be meaningful, therefore include inland fish production.

Table 1

Total marine landings for the period 1972-1979 for countries bordering the Southwest Indian Ocean, including Somalia

COUNTRIES	1972	1973	1974	1975	1976	1977	1978	1979
Comoros	3 000	3 000	3 500	3 850	3 500	4 000	4 000 F	4 000 F
FR South TR	1 000	1 000	1 000	410	410 F	410 F	410 F	410 F
Kenya	7 700	4 000	3 416	4 531	4 149	4 336	4 336 F	4 068
Madagascar	14 200	21 200	25 400	14 500	13 450	14 540	12 880	12 020
Mauritius	6 600	6 400	7 679	7 038	6 660	7 667	7 106	6 505
Mozambique	10 400	13 300	15 660	12 490	14 900	13 950	12 940	15 000
Réunion	2 200	2 500	2 677	2 213	2 092	779	2 007 F	2 007 F
Seychelles	2 500	3 000	3 500	3 950	4 010	4 600	5 400 F	4 957
Somalia	30 000 F	30 000 F	32 600	32 600 F	32 600 F	32 600 F	32 600 F	32 600
Tanzania	28 900	23 000	28 283	35 265	48 491	64 212	74 990	84 611
Total	106 500	107 400	123 715	116 847	130 262	147 084	155 869	166 178

Source: FAO Statistics 1979

F = FAO estimate

Table 2

Total landings by major species groups for 1977, 1978 and 1979 for countries bordering the Southwest Indian Ocean

COUNTRIES	All fish	Freshw. total	Marine total	Small pelagic	Demersal	Non identified	Tuna	Crus.	Moll.	Other
Comoros										
1977	4000	0	4000	1750	-	400	1800	50	0	-
1978	4000F	0	4000F	1750F	-	400F	1800F	50F	0	-
1979	4000F	0	4000F	1750F	-	400F	1800F	50F	0	-
FR South TR										
1977	410F	0	410F	-	-	200F	0	210F	0	-
1978	410F	0	410F	-	-	200F	0	210F	0	-
1979	410F	0	410F	-	-	200F	0	210F	0	-
Kenya										
1977	42779	38443	4336	517	2435	1074	20	208	2	80
1978	46394	41760	4634	747	3292	370	24	126	1	74
1979	51745	47677	4068	684	2994	187	30	158	3	12
Madagascar										
1977	56040	41500	14540	-	7500	-	-	6860	0	180
1978	54380	41500	12880	-	6300	-	-	6300	0	280
1979	53520	41500	12020	-	6100	-	-	5655	0	265
Mauritius										
1977	7668	1	7667	370	6154	577	2	35	529	-
1978	7111	5	7106	528	5647	418	37	18	458	-
1979	6520	15	6505	453	4928	489	21	48	566	-
Mozambique										
1977	18950	5000	13950	-	-	8500	-	5200	250	-
1978	17940	5000	12940	-	-	8000	-	4880	60	-
1979	20000	5000	15000	-	-	10000	-	5000	-	-
Reunion										
1977	779	0	779	14	-	275	323	167	-	-
1978	2007	0	2007	8	-	1347	445	207	-	-
1979	2007F	0	2007F	8F	-	1347F	445F	207F	-	-
Seychelles										
1977	4600	0	4600	1050	2830	500	220	-	-	-
1978	5400	0	5400	2080	2500	460	360	-	-	-
1979	4957	0	4957	1991	2177	250	435	1	51	52
Somalia										
1977	32600F[a/]	0	32600F	-	-	28854F	3465F	281F	-	-
1978	32600F	0	32600F	-	-	28854F	3465F	281F	-	-
1979	32600F	0	32600F	-	-	28854F	3465F	281F	-	-
Tanzania										
1977	288084	223872	64212	8432	27698	22600	4865	115	65	437
1978	294770	219780	74990	11678	27279	27400	7696	293	97	547
1979	344291	259680	84611	13127	30528	31400	8575	297	101	583
TOTAL										
1977	455910	308816	147094	12133	46617	62980	10695	13126	846	697
1978	465012	308045	156967	16791	45018	67449	13827	12365	616	901
1979	520050	353872	166178	18013	46727	73127	14771	11907	721	912

F = FAO estimate

a/ Somalia based on 1974 data. Landings peaked in 1976, but have since decreased to less than 4000 t in 1978. Soviet vessels retained in 1976 3400 t f fish and 1500 t of lobster (Puerellus sp)

4. Fisheries statistics for Southwest Indian Ocean are poor. Many of them are estimates made by FAO on the basis of a variety of sources. Table 1 gives the total marine landings for the period 1972-1979. The total for 1979 is reported as 166 000 t. This figure includes 32 600 t for Somalia which is felt to be much too high. Total catches by Somalia in recent years would not reach 5 000 t. The catch by major species group is given in Table 2 for the period 1977-1979. To the total marine landings of the area should be added tuna catches by foreign longline fleets in the 200-mi zones of the countries of Southwest Indian Ocean. These are given for the period 1972-1977 in Table 5 a. Tuna catches vary between 5 000 and 13 000 t for the years 1972-1976. Tuna catches of 41 000 t reported for 1977 are the result of an exceptional year around the Seychelles. In addition to tuna, foreign fleets operating in the Western Indian Ocean catch between 30 000 to 50 000 t of fish other than tuna. It is not known how much is caught in the 200-mi zones of the countries of the Southwest Indian Ocean but it could include a substantial proportion, particularly off Somalia, and to a lesser extent off Mozambique.

NATURE OF THE RESOURCES

5. The Southwest Indian Ocean is characterized by a narrow continental shelf, but island states such as the Comoros, Mauritius and the Seychelles are surrounded by offshore banks of appreciable geographical extension. Shelf and bank overall area is about half a million square kilometres. Primary productivity is not high in tropical waters which predominate in the region. It is essentially off northern Somalia, in the sector affected by the Somalia upwelling, that natural productivity is high.

6. The main fisheries in the region are generally small-scale, especially those on various demersal stocks, in inshore waters and offshore banks. Coastal pelagic resources (mainly clupeids) also support some local fishing. However, shrimp stocks in several places and tuna resources in oceanic waters have attracted industrial fishing, either locally based as in the case of shrimping, or coming from outside the region with respect to tuna longlining.

7. Available statistics suffer from various deficiencies in coverage, details and accuracy. Data on national catches in recent years are summarized in Table 1. A striking feature of this table is the moderate level of catches as compared with other regions, even in the Indian Ocean; the biggest marine catch (Tanzania) is around 80 000 t.

8. As mentioned in paragraph 4, the main fishery by countries outside the region is tuna longlining. Statistics of the tuna fishery are better and are reported in IOFC/DEV/80/48 of which Tables 5 and 5a are abstracts. There is also a small Spanish shrimp fishery off Mozambique, and in 1977 the USSR reported a catch of 30 000 t of jack mackerel from the Western Indian Ocean, probably partly from the oceanic banks in this region and partly off Mozambique. An Italian trawler fleet fishes off Somalia since 1978 but no data are available. The maximum catch reported by a Romanian fleet operating there was 3 500 t of fish and 1 500 t of Puerellus sp.

Demersal fish

9. The demersal resources are characterized by the large variety of species involved, with changes in species composition according to depth, areas, type of bottom, etc. The richness in variety - and in abundance - is typical of the coral reef communities. On the shelf, valuable commercial stocks appear to be concentrated in the shallower half, while less valuable resources with lower densities are found on the deeper half of the shelf and the slope. The one exception is the stock of deep sea lobster which is found at a depth of 200 or 300 m.

10. The scattered nature of the fisheries and their relative importance in the overall economy of the countries - except Somalia - have not facilitated the collection of statistics of the kinds required for assessing the resources. As a consequence, estimates of fish potential are often approximations. A number of assessments have been based on resource surveys. Trawling surveys have been carried out to assess the total standing stocks, and then, potential yields of demersal stocks on the trawlable part of the shelf. They were notably those by RV DR FRIDTJOF NANSEN off Somalia, the RV PROF. MESYAETSEV off East Africa from Kenya south and over the offshore banks, and by the survey vessel FAO-60 round Madagascar and the UJUZI off Kenya. They provided good information on the general species composition and biomass distribution of demersal fish in the surveyed areas (i.e., excluding the shallower zones and over rough ground). The detailed information can be found in the relevant reports.

11. Most of the available material, except that relating to Madagascar, was reviewed at workshops held in Karachi in January 1978 (for the resources of the north Arabian Sea, including Somalia) and in the Seychelles in October 1978 (for the resources south of the equator). The conclusions presented here are largely based on the results of those workshops. Generally speaking, it appears that where surveys have been made in the same area by two or more vessels there is reasonable agreement between the biomass estimates, bearing in mind that most figures are based on a relatively small number of hauls and have a high variance.

12. Estimates of potential yields for demersal resources are given in Table 3. The shelf off Somalia, especially in the northern area, is considerably more productive than the rest of the region. Good assessments cannot be made with the present data, but fairly conservative estimates would be for a potential yield of 2 t/km^2 north of 5°N and 0.5 t/km^2 in the less productive southern region. Off Mozambique, Madagascar and the Seychelles, the shelf is considered fairly productive.

13. However, there are extensive areas of rough grounds, including coral reefs, unsuitable for trawling. Most gear usable for fishing demersal stocks on such grounds (e.g., handline, traps, etc.) are highly selective and therefore unsuitable for assessing standing stocks. Some preliminary estimates of the potential yields of coral fish resources and their current state of exploitation have been estimated by comparing yields per unit areas and intensity of fishing (as number of traps per unit areas). Assuming that these can be treated as observations relative to resources of equivalent potential (i.e., assuming that all reef systems in the region have similar productivity), a yield curve can be obtained by normal catch/effort analysis. Doing this gives a curve with a maximum yield of about 5 t/km^2, with the intensity of fishing increasing from rather light off the east coast of Mahé, Seychelles to overexploitation round Mauritius.

14. For the other rough, untrawlable grounds, estimates of varying reliability are available from a number of approaches. On the Nazareth Bank the series of statistical data on number of fishermen engaged in the handline mothership fishery and on their catches allows a standard catch/effort analysis to be made providing an estimate of potential yield of around 2 000 t for the larger species sought by this fishery. Survey data from handline fishing can also be used in the same way as trawl survey data, but a lower value of natural mortality was used to account for the fact that catches are made up of larger, long-living species, and an addition was made for species not caught by lines.

15. Because of the poor quality of the statistics available, it is difficult to draw firm conclusions on the estimated potential catches of demersal fish by country. Nevertheless, the comparison of the estimated potential yield with present reported catches gives an indication of the amount by which fishing activities could be increased in each country. For example, catches of Somalia and the oceanic islands might be increased many times (see Table 3), catches of Kenya, Mozambique and Madagascar might be doubled, while those of Tanzania are probably near their maximum.

Coastal pelagic resources

16. Quantitative assessments of these species is bound to be very tentative at the present time. No fishery is sufficiently developed nor has adequate data to enable direct assessments of potential yields. Estimates of biomass are available from pelagic trawl and acoustic surveys by the research vessels PROF. MESYAETSEV and DR FRIDTJOF NANSEN. Estimates of standing stocks by trawl survey for pelagics as opposed to demersals is subject to appreciable bias due to the likelihood of substantial escape from the path of the trawl. Equally, there are problems in the quantitative use of the acoustic records, due to determination of target strength and the kinds and species and range of size detected during the survey. However, the estimates of biomass obtained by the two methods are in fair agreement for several areas (off Kenya, in Sophala Bay and on the Seychelles). There were discrepancies elsewhere (e.g., in Delagoa Bay), though these may be explained by the great variability (possibly due to seasonal changes in the distribution of stocks observed in several areas. For example, the availability of the Decapterus stocks on the Mahé plateau seemed to be particularly variable, being high in October 1977 and July 1978 but low in April 1976 and November 1978.

Table 3

Potential of demersal fish

Area		Area (km^2)	Estimated[a] present catch (demersal and crustaceans)	Potential yield/unit area	
				(t)	t/km^2
Somalia	North of 5°N	35 000	5 000	70 000	0.2
	South of 5°N	17 000		8 500	0.5
Kenya	Ungwana Bay (200 m)	6 800	5 000	4 300	0.6
	Other areas	12 400		4 950	0.4
Tanzania	All areas	18 900	21 000?	15 500	0.8
Mozambique	Sophala Bay	46 380	14 000	33 600	0.7
	Other areas	39 910		20 680	0.5
Madagascar	West coast	76 700	15 000	30 400	0.4
	East coast	43 300		13 200	0.3
Oceanic islands	Mahé Plateau	37 900	3 000	28 900	0.8
	Saya de Malha	52 300		15 000[b]	(0.3)
	Nazareth Bank	69 700	3 500	20 000[b]	(0.3)
	Others[c]	34 800		15 000[b]	(0.4)
Total		491 090		280 000	

a/ In cases where no breakdown between demersal and pelagic catches is available, half of the total catches was assumed to be demersal

b/ Approximate figure; few concentrations were found in these areas during surveys

c/ May be low

Table 4

Potential yields of small pelagic fish

Area	Main species	Potential (t)
Somalia	Sardinella, mackerel	200 000/250 000
Kenya	Carangids	10 000
Tanzania	Carangids, clupeoids	20 000[a]
Mozambique: Sophola Bay	Carangids, clupeoids	60 000
Delagoa Bay	Carangids, scombrids	20 000
Other areas	?	5 000[b]
Madagascar	Clupeoids	50 000/110 000[c]
Oceanic Islands: Mahé Plateau	Decapterus spp.	75 000
Saya de Malha	Carangids	50 000
Other areas	?	25 000/50 000[d]
Total		515 000/650 000

a/ May be low
b/ Approximate figure; few concentrations were found in these areas during surveys
c/ Assuming density is the same as the average for the African coasts
d/ Density taken as a quarter to a half on Saya de Malha Bank

17. The RV DR FRIDTJOF NANSEN identified large resources of small pelagics off Somalia near Eil and between Ras Hafun and Ras Asis. Maximum potential yields were estimated at between 200 000 and 250 000 t. Actual catches are minimal because of lack of infrastructure, unsuitability of fishing boats and the long distance to the fishing grounds.

18. Elsewhere the resources potentials are low compared to other regions of the world; areas where stocks are sufficiently large to support major large-scale fisheries are few. Off Kenya and Tanzania schools appear to be few and scattered, except for a concentration in the Zanzibar Channel. The latter, which support a significant local fishery, are mainly anchovies (Stolephorus) and round scad (Decapterus macarellus).

19. Pelagic resources are somewhat more abundant off Mozambique, particularly northward from Beira (between 18° and 20°S). The main species are clupeoids (including Pellona ditchela, Thrysea vitritostris and Stolephorus buccaneri), and scads (Decapterus spp.).

20. Round Madagascar, areas of higher fish density are distinctly localized, with very few along the western side south of 16°S (information on the southern part of the east coast is scanty). North of 16°S, though, schools were more frequent, particularly in the Baie d'Antongil. Schools consisted of anchovy and sardinella.

21. One working approximation used for Madagascar is that the biomass and yield per unit area of pelagic fish are the same as those off East Africa mainland coast. This gives an estimate considerably larger than that for demersal fish, i.e., 110 000 t. Another estimate used is that the pelagic and demersal potentials are equal, i.e., 50 000 t.

22. Over the offshore islands the commonest species was round scad (Decapterus macarellus); its abundance over the Seychelles Bank varies considerably with the seasons. On the offshore banks other than the Mahé Plateau and Saya de Malha, pelagic fish seemed scarce, as judged by acoustic records and trawl catches.

23. Imported stocks of mesopelagics were identified off Somalia (730 000 t in the south and 155 000 t in the northern area). It has been determined that the stock is composed of a number of species of myctophids, that the fish are very small and have in general diurnal migration from 400 m during daylight hours to a surface dwelling at night. The density of the stocks appears to be higher than in other parts of the world where mesopelagics are also found, although more research is required to develop their exploitation. The catching of mesopelagics is simple but processing, the economics of their catching, processing and marketing are likely to be the real limiting factors.

24. As illustrated in Table 4, the potential of coastal pelagic resources is estimated at 500 000-650 000 t for the region. Almost half of this amount is found off Somalia where the exploitation is presently limited because of lack of capacity (boats, motors, gear, processing, etc.). Most of the remaining half of the stocks are found off Mozambique (85 000 t) and around the Seychelles (125 000 t). Excluding the catches made by Somalia, for which no recent estimate is available, total 1977 production was about 40 000 t[1/] of which 16 000 t were caught by Tanzania.

Crustaceans

25. Concentrations of shallow-water penaeid shrimps, which form the biggest crustacean resources of many tropical regions, are confined to a few limited parts of the region, principally off large rivers, estuaries, or other areas with suitable inshore nursery areas. The largest stocks are probably off northwest Madagascar and off Mozambique (in Maputo Bay, between Beira and Chiloane and on the Sophala Bank), though there are also stocks of local importance off Kenya and Tanzania (near the Rufiji River mouth).

26. The shrimp fisheries are the only ones in the region for which reasonably good assessments are available. The best studied, and also the most fully developed, are those in northwest Madagascar, which are fully exploited with a potential yield of around 5 000 t. The larger Mozambique fishery is less heavily exploited, and there seems some opportunity for expansion from the 1978 figure to 10 000-12 000 t to perhaps 17 000 t. The other shrimp stocks in the area cannot sustain very large catches. The potential of Tanzania (Rufiji and Bagamoyo deltas) has been estimated at 5 000 t; adding in the potential of other areas, the total for shallow-water penaeid shrimps is probably around 27 000 t.

27. The catch rates of deeper water crustacea (in depths of 200-2 000 m) are somewhat promising. A number of surveys have been made, e.g., round La Reunion, Kenya and Madagascar, with trawls and pots. The reasonable catches taken in these surveys have so far not been followed by commercial development. In view of the relatively small areas involved and the likelihood that production (as opposed to standing stock) at these depths is relatively low, it cannot be expected that total sustainable yield will be high (at best a few thousand tons for the region as a whole, and probably lower).

28. Deep water shrimps and other crustaceans, especially rock lobsters (Palinurus spp.) have been found in most areas where exploratory fishing has been carried out with suitable gear (traps or shrimp trawls). Off Somalia a stock of baby lobster (Puerellus spp.) has been quite heavily exploited from 1975 to 1977. The data from this fishery have not yet been analysed to provide first estimates of potential and state of exploitation; it would be wise to do so before the fishery is expanded. The maximum related catch has been 2 500 t in 1977.

29. The stocks of spiny lobsters are probably small - the standing stock off the Kenya coast has been estimated at around 300 t, while a stock of similar size is found near Somalia's southern border. Present catches are mainly in very shallow water - the main fishing method in Kenya and in Tanzania is by diving - and could almost certainly be increased by moving into rather deeper water. It is less certain whether the catch rates would be sufficient to support a commercial industry and, in any case, the total potential catch is small.

1/ Assuming that half of the non-identified catches (50 000 t) are pelagics

Molluscs

30. The most conspicuous economic profit derived from molluscs in the region comes from sale of shells to tourists and collectors; this aspect is not considered further here, though it should not be neglected in considering the conservation and use of marine resources. Similarly, the collection and sale of reef fish and shellfish to aquarists can be of locally economic importance, but is not considered here.

31. Cephalopods, especially octopus, are fished locally, but do not support significant directed fisheries and the stocks on the shelf areas are probably small. Larger squid resources might be available in the oceanic areas, but there is little information to suggest that the stocks are particularly large.

32. Other molluscs (clams, mussels, etc.) are not consumed locally to any extent except in Mozambique (100 t). Presumably stocks exist in many of the areas of softer bottom, but there is little information.

Table 5

Tuna catches by foreign longline fleets[a] in the 200-mi economic zones of the Southwest Indian Ocean in 1977, by species (t)

Area	SO BF[b]	YF	ALB	BE	SJ	SF	Marlins	Sail	Total	Catch rate[c]
Comoros	0	482	65	159	0.4	3	76	1	786	1 486
French southern territory	136	5	38	14	0	1	1	0	196	1 024
Kenya	0	418	4	310	0.5	9	37	1	780	1 648
Madagascar	2	390	938	157	0	26	58	1	1 572	1 076
Mauritius	9	3 281	1 775	1 100	8	47	321	12	6 552	1 314
Mozambique	0	220	53	79	0	1	57	0	411	1 194
Réunion	1	207	869	84	0	10	48	1	1 220	1 044
Seychelles	2	14 894	212	8 444	18	115	475	33	24 193	1 850
Somalia	0	980	4	851	2	19	145	3	2 004	1 954
Tanzania	0	2 010	50	1 376	6	27	126	3	3 597	1 808
Total	150	22 887	4 008	12 574	35	258	1 344	55	41 311	

a/ Japan, Korea and the island of Taiwan. Only a small part of this catch is landed in the area for transshipment or processing

b/ SO BF = Southern bluefin tuna
YF = Yellowfin
ALB = Albacore
BE = Bigeye
SJ = Skipjack
SF = Swordfish
Marlins = Blue and striped and black marlin
Sail = Sailfish

Source: IOFC/DEV/80/48

c/ Catch rate in kg/2 000 hooks representing daily catch for all species for comparison:
a) Indian Ocean all 200-mi zones 1 535 kg/2 000 hooks
b) Indian Ocean high seas 1 240 kg/2 000 hooks
c) Entire Indian Ocean 1 326 kg/2 000 hooks

Table 5a

Tuna catches by foreign longline fleets within the 200-mi economic zones in West Indian Ocean countries, 1972/77

Area	1972	1973	1974	1975	1976	1977
Comoros	629	22	84	268	1 370	786
FR South TR	19	156	920	941	232	196
Kenya	256	132	316	191	50	780
Madagascar	905	1 596	394	645	1 709	1 572
Mauritius	815	576	363	1 323	3 956	6 552
Mozambique	643	55	418	481	927	411
Réunion	765	817	601	392	1 419	1 220
Seychelles	2 835	854	1 243	4 148	2 130	24 193
Somalia	1 604	436	1 433	2 617	580	2 004
Tanzania	662	231	276	330	325	3 597
Total	9 133	4 875	6 054	11 336	12 708	41 311

Source: IOFC/DEV/80/48

Tunas

33. Tuna support the major industrial fishery in the region - the longline fishery for large species, carried out by fleets from eastern Asia. Catches given in Tables 5 and 5a cover most of the tuna catches by non-local countries in the area. Though the stock structure is not well known fish concentrations available in the Southwest Indian Ocean are probably part of stocks fished in other parts of the Indian Ocean, e.g., in the more northern part of the Arabian Sea, in the case of yellowfin and skipjack, and in the eastern Indian Ocean in the case of albacore, bigeye and possibly yellowfin. Some fishing on the same stocks of yellowfin or skipjack may occur elsewhere, e.g., round the Maldives or in the northern Somalia Gulf of Aden region.

34. Recent assessments show that concentrations of large tunas are heavily fished, and that the average catch rates (and hence the profitability of fishing, and the possible capacity to pay licence fees) would be increased if the total effort were decreased, particularly in the case of yellowfin.

35. The stocks of smaller tunas such as skipjack, as well as the smaller sizes of large tunas, have not been exploited to a significant extent in the region since the skipjack fishery in northwest Madagascar closed down in 1974. The high catches of tuna in the statistics reported by Tanzania (see Table 5) cannot be explained since the fleet to catch this amount far exceeds national capacity. The estimates given for Somalia appear to be too high since most of the processing capacity has broken down. The biological capacity for increased catches of these sizes of tuna certainly exist. However, it is not possible with currently available data to make a meaningful estimate of potential. Nor is it possible to determine whether such a development would be economically profitable. A Japanese purse seiner based in Mauritius is exploring the possibilities of a skipjack fishery in the area.

STATUS OF THE INDUSTRY

Catching

36. The land and sea activities of the fishing industry in the Southwest Indian Ocean are characterized by their small-scale, if not their plain subsistence aspects. The occurrence

of strong winds and currents with heavy seas off the windward shores, in particular off Somalia and Kenya, and the scattered distribution of fishery resources over wide areas have strongly influenced the small-scale fisheries (mainly of the traditional and artisanal types) which have remained nearly unchanged for decades at very low technical level.

37. The fisheries are mainly carried out with small craft, i.e., individually (or 2-3 men) operated dugout or planked canoes, with or without outrigger, small houris and dhows, as well as other types of boats generally not exceeding 16 m in length. Sail, oar and paddle are still widely used as propulsion means, especially for the smaller boats. However, small craft motorization, with outboard motors or inboard diesel engines, has progressively been achieved in some countries, such as Comoros, Somalia, Mauritius and the Seychelles, although in Comoros and Somalia the lack of mechanics and spare parts has led to a decrease of motorization over recent years. The gear used are very simple and mainly consist of handlines, basket traps; fixed or barrage traps, gillnets or tanglenets, longlines and beach seines. Furthermore, fishing with harpoons or by skin diving is still widely used, the latter, in particular, for spiny lobsters. Other techniques are also worth mentioning, such as trolling lines for tuna-like species, tried successfully in the Seychelles and the Comoros, and small-scale purse seines with light attraction in Tanzania.

38. Fishing is usually carried out in sheltered waters, i.e., off the leeward shores (e.g., the west and north coasts of Madagascar); in the lagoons, along the coral reefs and in the estuaries or mangrove channels. Daily trips are the general rule; however, the large boats may undertake trips of longer duration, as for instance in the Seychelles, for exploiting offshore reefs.

39. The industrial fisheries are mostly represented by tuna fishing vessels, trawlers - in particular for shrimp - and handliners (motherships with small catchers). The tuna fleet comprises modern offshore longliners, purse seiners and pole-and-line vessels, partly operated either under licence by countries outside the region or under joint venture agreements. The trawlers are concentrated in the areas where the continental shelf is sufficiently devoid of coral and the current not too strong; this is the case for instance the year round for some grounds off Somalia (inshore), northwest Madagascar, Kenya (Ungwana Bay), Tanzania and Mozambique and during part of the year off Somalia and Kenya in deeper waters. Most of the shrimpers are Gulf of Mexico type shrimp trawlers ranging from 15 to 30 m in length, but there are also some larger trawlers fishing for bottom fish and lobster. As for the mother-ships with small catchers, there are only a few units mainly working with handlines on the offshore banks, e.g., on the Mauritius-Seychelles plateau. Purse seiners are used in Tanzania and pole-and-line vessels in Seychelles.

40. Although of relatively little significance in terms of production, sport fishing (e.g., for big game fish) is gaining importance as a source of foreign currency particularly in Kenya, Mauritius, Seychelles and Tanzania.

Utilization

41. It is also clear that most activities in fish processing, utilization and marketing are conducted at the artisanal level. The catch brought ashore is first consumed fresh. All surplus not consumed or unsold is preserved by sun-drying or, less frequently, by smoking. Salting before drying is often carried out and is common practice in the processing of sharks.

42. Facilities for storage of fresh fish in most landing places do not exist or are very poor. Ice is hardly used in artisanal fisheries and because of this, as well as improper handling, the quality of fish is generally poor and losses due to spoilage are significant.

43. The drying of fish is carried out in the traditional way on mats or racks but in many places still straight on beach sand with insufficient attention paid to quality. The conditions of storage and subsequent handling often result in heavy losses, particularly from insect infestation.

44. Smoking is also done in the traditional way with simple earthenware ovens. The inefficient nature of the equipment and the absence of any proper storage facilities cause a significant slow-down in production during rainy seasons.

45. With the exception of the areas close to larger consumption centres, collection systems for fresh fish are inadequate, and efforts to strengthen them have in most cases failed due to bad road networks (lack of ice storage facilities and refrigerated transport).

46. The distribution of fresh fish is therefore concentrated mainly along the coastline or shipped to important population centres such as the capitals. The distribution of fish is also in some areas affected by traditional and social restraints. In such countries as Somalia, Kenya and Tanzania there are large groups of the population who are not fish eaters.

47. In the sixties and seventies, efforts were made in several countries of the region to develop an infrastructure for processing industrially the most valuable species for export, in order to earn foreign exchange. Several cold stores, ice-making plants and canneries have been built in the region, some of which were intended for transshipments. Available data on these facilities are given in Table 6. These data are not recent and are not quite reliable because several ice plants, cold stores and canneries are not operational due to lack of spare parts, proper maintenance, skilled personnel or even raw material. For example, the largest freezing factory in the Southwest Indian Ocean region situated at Bolimor in Somalia is not operational for many reasons, including the shortage of raw material, which was expected to be delivered by fleets of houris and other small boats. A similar situation exists in the two canneries in Somalia, which could process daily up to 40 t of tuna. Also, most of the ice-making plants in Tanzania are out of order.

48. Moreover, it is common practice in many countries to use cold store capacities not only for fish but for other food products. This greatly reduces cold store capacities available for fish as given in Table 6. Nevertheless lower transshipments or decreased fishing activities may make it economically necessary to use the facilities for other food products. The situation is no better as regards ice production, which is normally far below fisheries requirements but, despite this, very often a great part of the ice production is channelled to other food products. Taking all of this into account, it is clear that the amount of fish processing facilities available for fisheries in the Southwest Indian Ocean region is limited but as most fisheries are artisanal for direct human consumption, preferably in fresh state, it is not a major constraint as yet.

FISH CONSUMPTION

49. The importance of marine fisheries varies widely throughout the region but they are generally only of major economic significance in the island countries. In the Seychelles, for example, fish represent about 20 percent of total expenditure on food and accounts for an estimated 50 percent of total protein intake - consumption *per caput* is among the highest in the world. No data are available in overall fish consumption but in Mauritius, which has a slightly more diversified economy, fish represents 10 percent of total protein intake and 30 percent of the supply of animal protein. As a generator of employment opportunities the fishing industry is again of importance in the Seychelles, accounting for about 4-5 percent of the economically active population. In the mainland countries marine fishing is generally an activity of small economic importance, the principal exception probably being the shrimp fisheries of Tanzania and Mozambique which provide an export product worth a few million dollars annually. However, the impact of fisheries on the balance of payments is again greater in the island countries - with fishery exports for the Seychelles although only of the order of US$ 5½ million, accounting for around 15 percent of total commodity exports. Fish products also represent an important element in the foreign exchange earnings of Madagascar (around US$ 10 million/year), and Mauritius where they provide a small but useful source of diversification from sugar. Even though fisheries may not represent an important economic activity for some countries the fact remains throughout the region that fisheries is often the only gainful employment available and as such must receive some priority on social, if not economic, grounds. Increased participation in tuna fisheries could also yield substantial economic and social (employment) benefits.

Table 6

Industrial fish processing facilities in the Southwest Indian Ocean region

Area	Ice production t/day	Chilled storage capacity (t)	Freezing t/day	Cold store capacity (t)	Canning t/day	Fish meal t/day
Mauritius	14	86	-	3 000	-	-
France (Reunion)	5 (stocking 20 t)	-	-	60	-	-
Madagascar	44.2	173	75	4 000	-	-
Seychelles	-	-	-	1 100	-	-
Kenya	60	50	?	2 000	-	-
Tanzania	17.5	770	36-46	510	-	-
Somalia	4	?	40	3 000	60	24
Mozambique	?	-	?	3 200	pilot plant	-
Comoros						

Source: based on FAO/IOFC/DEV/71/11 B and IOP/Tech/75/3

50. Estimated per caput fish consumption and total estimated demand up to year 2000 is given in Table 7. Taking total nominal catches of the area (both inland and marine) it appears that the region as a whole will continue to be self-sufficient in fishery products up to the year 2000. Indeed the projection of total demand for 1985 (439 000 t) is smaller than the total 1978 landings (456 000 t), thus leaving a fair margin for exports outside the region.

51. Greater participation of coastal and island states in the exploitation of underutilized or new marine resources and the full development of the inland fishery potential would, in the long run, make it possible for the region to contribute positively to the protein balance in East Africa. Limits on intraregional trade caused by lack of infrastructure, fish collection and road networks or suitable products will therefore become a major constraint for all countries of the Southwest Indian Ocean.

FISHERY DEVELOPMENT CONSTRAINTS AND OPPORTUNITIES

(a) Constraints

52. Constraints in the catching, processing and marketing sectors are mostly of a natural and socio-economic nature. The narrow and steep continental shelf, together with wide distribution of coral reefs, prevents the general extension of bottom trawling. Very strong currents off Kenya and Somalia inhibit all year round offshore trawling. Strong winds, such as the seasonal monsoons and the southeast trade winds, create rough seas for long periods. These hostile conditions impair the continued operation of canoes and other small or medium-size boats in areas such as Somalia, Kenya and the east and south coasts of Madagascar. Furthermore, the density of commercial species decreases appreciably with the depth of the continental shelf making trawling economically unattractive on offshore grounds. The exploitation of small pelagics which appear to be abundant off Somalia will necessitate a major effort from that country. It may be that options other than direct national participation in the fishery could be considered initially.

53. The fishery statistics reported in Table 2 are mostly FAO estimates based on a variety of more or less adequate sources. An effort needs to be made throughout the region to improve on the quality of fishery statistics reporting.

Table 7

Estimated demand for fish

Area	Population 1978 (million)	1975	1980	1985	1990	2000	1975	1980	1985	1990	2000
		(kg) per caput demand					total demand ('000 t)				
Somalia	3.4	1.2	1.2	1.2	1.2	1.3	4	4	5	6	8
Reunion	0.5	20.6	20.7	20.9	21.3	21.5	10	12	13	15	17
Mauritius	1.0	15.1	17.1	19.2	21.4	26.2	14	17	21	25	35
Mozambique	10.0	2.1	2.0	2.0	2.0	2.2	20	21	24	28	40
Kenya	15.2	2.5	2.6	2.7	2.8	3.1	34	43	54	68	105
Tanzania	16.8	13.3	13.0	12.9	12.8	12.8	205	234	272	317	433
Madagascar	8.3	6.5	6.3	6.2	6.3	6.7	50	55	63	72	101
Seychelles	0.06	68.0	68.2	68.3	68.3	68.5	4	5	5	5	6
Comoros	0.3	12.4	12.6	12.9	13.2	13.6	4	4	5	5	6
Region	55.56	6.8	6.7	6.7	6.7	6.8	345	395	462	541	751

54. There is a general shortage of facilities, in particular at village level, for the construction, maintenance and repair of boats. The lack of spare parts and repair services for engines is also a serious drawback which impedes the continued operation of motorized boats. In most countries of the region there is a poor supply of fishing gear and materials (e.g., yarns, netting, ropes, floats, etc.) which impairs the introduction of more efficient fishing techniques, such as gillnetting. Most fishermen's villages, in particular those of the subsistence type, are isolated; it would be difficult to improve their living and working conditions without the assistance of regular supply and fish transportation schemes, with connexions to the important urban centres.

55. The distribution of fish in such countries as Somalia and Mozambique is limited to a rather narrow belt along the sea coast, leaving the interior without any supply due to the bad road systems, the high temperatures unfavourable to preservation and the lack of storage and distribution facilities. In coastal countries and Madagascar this gap is filled by inland fisheries which play a very important role.

(b) Opportunities

56. Investment - both foreign and domestic - in industrial fisheries has not always given the expected results. Often facilities have been set up without careful feasibility studies and due to the lack of spare parts and proper maintenance, breakdown rapidly and become non-operational.

57. In spite of the serious constraint already mentioned, it seems that locally there are reasonable opportunities for development, in particular in the artisanal and semi-industrial fisheries. Non- or little exploited resources call for the improvement of traditional or the introduction of new fishing boats, gears and operations. Examples are: boats for offshore operations, low energy propulsion (sail-cum-auxiliary engines), simple hauling devices, pole and line, longlining, trolling and driftnetting for tuna and tuna-like species, small-scale pair trawling, small- and medium-scale purse seining (with and without light attraction) for small coastal pelagic fishes, mangrove swamp fishing and fish culture techniques, fish aggregation devices, etc.

58. There is no major problem with fishing techniques for mesopelagic fish but the most difficult and involved problem is with processing and marketing at competitive prices. Although it was shown that fish meal from mesopelagics is safe and can be used for animal feed, it will require rather sophisticated vessels with either refrigerated sea water/cool sea water installations or a fish meal plant onboard. The economics of low value species such as mesopelagic species which can be used for fish meal is directly linked with the costs of production (energy in particular) and the prices the market is willing to pay for the products. Additional research on the biology of mesopelagics - the determination of the range of year to year fluctuations in stock abundance will be of direct relevance for the future of the industry - as well as on processing technology is an important prerequisite to investments in this sector.

59. There is a general lack of sufficient knowledge of all traditional fishing boats, gear and operations as a base for systematic development and the transfer of fishing technologies. National specialists should be encouraged to prepare such reviews with the appropriate technical details, the evaluation of which will enable the identification of opportunities and priorities for development. This would be a natural first step in the establishment of national competence and capacity in this field.

60. Most urgent needs also exist in the field of fish handling, collection and distribution systems. It is clear that sufficient concentration of catches is necessary to justify setting up modern landing facilities. Considering the existence of unfavourable conditions such as the moderate abundance of the resources or the generally low purchasing power of potential consumers, careful economic analyses need to be carried out prior to important capital investment. For such studies data on catching, processing and distribution costs and markets need to be significantly improved. Modern processing techniques should be developed only for

luxury products or export products capable of being sold at a high price. Simultaneously, more effort could be put on the improvement of traditional processing techniques and modernization of traditional equipment but without altering its artisanal character. An updated review of present handling, processing, distribution and marketing systems in the artisanal, semi-industrial and industrial sector of fisheries in the region should be recommended for all countries, except Somalia where it was recently done.

61. Finally, trade between the countries bordering the Southwest Indian Ocean should be encouraged particularly since some countries are net importers of fishery products.

SUGGESTED ACTION BY THE COMMITTEE

62. This document reveals that potential for further increase of fishery production does exist in the area, although it is unevenly distributed between the countries.

63. It stands out clearly, however, that fisheries are for the most part small-scale and that fishermen's conditions of living and income would improve directly with their upgrading. It is evident also that the fishery administration in most countries of the region is aware of the constraints on fishery development. Discussions of these problems in a regional forum such as the one provided by the Committee would facilitate the elaboration of effective national and subregional strategies to tackle these issues.

APPENDIX I

SUPPORT FOR FISHERIES ADMINISTRATION AND MANAGEMENT

Summary

This paper briefly reviews the activities which should be stimulated to accelerate the development and management of the fisheries in the Southwest Indian Ocean. The identified needs are compared with the present capabilities of coastal countries in the field of fishery administration and research. This information and considerations which are made on the specific role to be played by a regional aid project in this area are intended to provide a basis for discussion on the priority tasks which should be assigned to the Project for the Development and Management of Fisheries in the Southwest Indian Ocean.

INTRODUCTION

1. This paper directly complements working document IOFC:DM/SW/81/4 entitled "Review of Fisheries Development in the Southwest Indian Ocean". In that document it was noted that the continental shelves in the Southwest Indian Ocean, over which the bulk of the fishery resources are located, are in average, narrow. The new ocean regime has brought these resources under the jurisdiction of coastal and island States. The zones of jurisdiction also include large expanses of deep water areas, where conventional resources are limited to tuna and related species. In the tropical sector, the abundance of fishery resources is, in general, moderate. However, off Somalia, important stocks of small pelagic and demersal species are available and only marginally developed.

2. Historically, the fisheries carried out by the coastal countries have been mostly artisanal. Foreign vessels have limited their operations to the exploitation of tunas in open waters and of shrimp and other valuable demersal stocks over the shelves of the more productive regions.

3. Although, with the exception of Somalia, prospects for substantial increases in physical yields are limited, there is an immediate need and opportunity for countries in the area to upgrade their small-scale fisheries through the improvement of their economic efficiency especially in the utilization of the catch and of the living conditions of their fishermen communities. Because of resource limitations, actions to increase the volume of the catch must be selective, and directed to those resources where there is a reasonable prospect of increased yield. National capabilities required for those purposes, as well as to increase participation in and control of the fisheries exploited by foreign vessels need to be strengthened.

4. The constraints are numerous. Throughout the region the levels of capital, technology, managerial and entrepreneurial skills required to upgrade national fisheries and to increase participation in fisheries where foreign fleets have been involved are often modest. The administrative, technological and scientific capabilities which condition the identification of development opportunities, the planning and adequate use of capital and know-how required for achieving them and the formulation and enforcement of sound management schemes are scarce.

5. The purpose of this document is to stimulate discussions, from a comparison of present development opportunities and management needs on the one hand and of existing capacities on the other hand, to formulate strategies and identify activities which should be promoted, at national and regional levels, to upgrade the region's fisheries. In so doing it is expected that the specific contributions which the Regional Project for the Development and Management of the Fisheries in the Southwest Indian Ocean can make in this endeavour, will be further clarified.

RESOURCES INVESTIGATIONS

6. The successful development of fisheries depends on the availability of adequate information on a number of parameters, especially on the:

(i) overall abundance of the resources;

(ii) their distribution pattern and the seasonal and geographical changes in their catchability;

(iii) environmental factors, e.g., weather, current, bottom conditions, etc.;

(iv) unit market value of the resources;

(v) most efficient fishing and processing methods under current circumstances and the corresponding costs of fishing and processing;

(vi) availability of required inputs such as, investment, finance, skilled manpower - including managerial and entrepreneurial skills;

(vii) available infrastructure, markets, etc.

All these factors need to be weighted in feasibility studies before decisions can be made regarding the advisability of investments. For unexploited or marginally exploited stocks, quantitative resource surveys provide estimates on (i) and (iv) while estimates on (ii), (iii) and (v) are often only approximative. To clarify (v), resources surveys need to be followed up by exploratory fishing and stimulated commercial fishing cruises. When the most appropriate type and size of vessel and fisning method, etc., have been determined, the economic profitability of a new fishery, i.e., how the value of the catch compares to the cost of fishing and processing can be assessed. In doing this the decline in stock abundance and in catch rates, as resources become more heavily exploited, have to be borne in mind.

7. As indicated in document IOFC:DM/SW/81/5 resource survey work has been carried out in recent years in various areas and with different research vessels; PROF. MESYATSEV or DR F. NANSEN have covered the most extensive geographic areas. In certain sectors, these surveys need to be followed up. Sometimes more intensive resource surveys to refine estimates of potential yields and of catch rates are needed to ascertain whether known resources are sufficiently abundant to enable commercial exploitation as was the case recently off Kenya. Elsewhere, simulated commercial fishing is needed to determine the best conditions for successful fishery development.

8. In a gradually expanding fishery, however, the routine, but careful monitoring of its performances will yield data which will allow more and more refined assessments of its potential yield and adequate conditions of exploitation. The collection of catch and effort data on commercial catches, complemented by adequate information on their size and species composition, is the most readily available and useful tool for resource assessment and monitoring. Even when resources surveys are still required to overcome the special difficulties encountered in the monitoring by classical stock assessment methods, of certain fisheries (e.g., the monitoring of highly fluctuating stocks such as those of small pelagics or that of artisanal or foreign fleets for which comprehensive data are operationally difficult to obtain), current total catches need to be approximately known to be able to interpret the survey estimates of standing stocks in terms of rates of exploitation, maximum potential yields and then development prospects and management requirements.

9. When resources have been exploited by foreign fleets, extremely valuable information regarding the optimum fishing methods and gear and the possible economic profitability can often be derived from the analysis of historic statistics on the fishing performances of such vessels. The existence in the area of exploitable concentrations of large tunas and related species is demonstrated by the operations of foreign longlines (IOFC:DM/SW/81/4). From past joint ventures, surface schools of skipjack and young yellowfin tuna are known to be harvestable by surface gear, such as pole-and-line and possibly purse seine, although availability is limited to certain areas (e.g., the triangle between Northern Madagascar, Seychelles and the Comores) and seasons. The lack of adequate supplies of bait is a problem in certain places.

10. In the case of small-scale and artisanal fisheries, there are difficulties in the Southwest Indian Ocean, as in most regions, in collecting statistics of an adequate quality for stock assessment purpose. Because these fisheries are widely scattered, often in remote areas, because of the great variety of species caught and of the versatility in fishing methods, the collection of meaningful data raises particularly complex operation and sampling issues. Only a few countries have developed and established effective statistical schemes for their artisanal fisheries. This is a sector where technical assistance, especially for the design and conduct of frame surveys from which sound statistical systems can be developed, is urgently required. In the case of shared stocks, such as tuna, national statistics need to be put together for assessing the stocks. To ensure compatibility of national data, standardized methods for data collection and reporting are needed. In part, such need is not limited to stocks found in international waters and shared stocks in the EEZ of the countries of the area. A particularly useful approach for assessing the region's stocks is through the comparison of the yields obtained in different fishing grounds throughout the region. Compatibility of national statistics will greatly help the computations and the development of yield indices of regional relevance.

11. Reef fisheries and generally speaking all those distributed over rough bottoms, present special assessment problems due to the highly selective nature of the gear which can be used, either for their exploitation or for sampling the standing stock through survey work. In most cases, no estimate of absolute biomass can be derived with the currently available survey methods. However, estimates of maximum effective potential yields corresponding to the fishing gear and methods employed in a given fishery can be derived sometimes from the comparison of the yields obtained in different geographic sectors exploited with different fishing intensities. The maximum yield indices thus derived can then be extrapolated to other comparable areas for which no fishery statistics are yet available.

12. Because of the size of the region, the limited scientific capabilities presently available and the methodological difficulties encountered, the evaluation and monitoring of the fish resources of the Southwest Indian Ocean is no small task. Regional collaboration can effectively complement and enhance national activities in resource evaluation. National statistical systems could be upgraded through the sharing of the services of a regional fishery statistician who could provide technical guidance to member countries, e.g., for the design of frame surveys and for the standardization of the format and procedures for data collection and reporting. Regional activities such as working parties and seminars, which have already lead to substantial and appreciated results, could, with additional means, be further developed to improve the present knowledge on the resources while strengthening national expertise. Experience has indeed shown that frequent contacts for exchanges of information and views, critical examination of research results, joint development of new approaches for stock assessment, etc., are an essential condition for the full development of national expertise, especially for junior scientists. When further resource survey work is required, the joint utilization of research vessels and the coordination of survey programmes can bring substantial economies of scale. More generally regional cooperation should speed up the development and application of assessment methodologies better adapted to the characteristics of the fisheries and the conditions for research investigations in the region.

13. One sector where such cooperation would be particularly important is fishery management and in the case of shared stocks (see paragraphs 26 and 27). The determination of adequate mesh size limitations for trawl fisheries, the formulation of schemes to regulate fishing effort in the intensively-exploited fisheries, the comparison of alternative schemes for controlling fishing effort and maximizing the economic revenues from foreign fleets, as well as several other topics which are briefly reviewed in paragraphs 21 to 31, need to be rapidly investigated and adequate solutions formulated. The similarities in the characteristics of the region's fisheries, in the issues and constraints they are facing, among which the limited administrative and scientific capabilities available is not the least; reinforce the value of an intensification of regional cooperation. This should facilitate a better use and development of the scarce national expertise and institutions, as well as of foreign assistance.

RESEARCH AND DEVELOPMENT IN FISHERY TECHNOLOGY

14. In the region, the availability of skilled manpower, of managerial and entrepreneurial skill and of infrastructure is often low, resulting in a slow upgrading of existing fisheries, especially small-scale, and slow development of new fisheries. One solution to temporarily overcome the effects of such shortages, while facilitating the acquisition of expertise and experience, could be to permit foreign vessels to exploit certain national resources on payment of license fees, the establishment of joint venture arrangements or any other mutually suitable agreements. For example, Mozambique is allowing continued foreign fishing for shrimp and small pelagic fish on terms, e.g., the building up of national research capabilities which will facilitate the later development of its national fisheries. Similarly, Madagascar has been exploiting its shrimp resources and has temporarily participated in a tuna fishery through joint venture arrangements. Foreign countries have shown interest at one time or another in the resources off Somalia (all stocks) or on the Seychelles plateau (small pelagics). However, the exploitation of large resources of low values species in remote areas remains a problem when, as off Somalia, the economic yields are not attractive enough.

15. Coastal countries generally consider licensing and joint venture arrangements as interim solutions and want to rapidly increase their direct participation in the exploitation and utilization of the fish resources they now control. One condition for such development is the availability of appropriate national expertise in the fields of fishery technology. Fishing and fish technology deal with the transfer and development of appropriate and efficient techniques of fishing and fish utilization: fishing gear and methods, fishing vessels, auxiliaries and instrumentation, fishing strategies and tactics as well as fish processing and preservation. In the region, research and development in these fields should concentrate on the improvement of small-scale fisheries which dominate the sector and presently suffer from low efficiency, low quality products, heavy postharvest losses and low prices.

16. A first step toward the technological upgrading of artisanal fisheries would be a critical evaluation of present fishing, handling and processing techniques and of distribution and marketing practices. Most countries have little means, especially expertise, to study and develop improvements well suited to local conditions. Regional cooperation, through the organization of seminars, workshops and training courses, etc., could play an effective role in enhancing national capabilities. National administrations could be assisted through the provision of advice, by short term consultants, on possible improvements in fishing gear and methods, boats, processing methods, market development, support of fishing cooperatives, improvement of extension services, etc.

17. The requirements for the establishment of national fishing technology units were recently assessed in Kenya and Tanzania. The conclusion reached by the consultant[1/] was that very useful and important work in fishing can be done at small expense provided there is a technical unit with competent staff and the basic means and mobility to work with the fishermen in the field. He recommended the establishment of such fishing technology units which could start with comparatively simple improvements of existing crafts and gear and expand to more demanding tasks in accordance with increasing experience and capacity. Follow-up consultancies, perhaps financed by a regional project, were suggested to assist in the detailed identification of suitable development activities as well as in the identification, formulation and implementation of respective projects which, to start with, would concentrate on small-scale fisheries. This approach could have wide application in the area.

18. Research on various types of gear and fishing methods is being carried out in several countries in the area, e.g., Zanzibar (purse seine, snapper reels), Kenya (various trawls, snapper reels), Mozambique and Somalia (hooks and nets for sharks), Seychelles (tuna surface fishing). Specific attention should be devoted to developing sail-cum-auxiliary motor propulsion on grounds of economy and safety. Similarly, the introduction of simple navigational aids such as compasses or echo-sounders and simple auxiliary machinery for local construction such as reels for handlining, line and net haulers, trawl and purse seine winches, would be desirable.

19. Special fish technological research does not take place in the area, but there are experiments in fish processing going on in Somalia. It would seem that fish processing technology and quality control is much neglected, resulting in poor quality products and low demand.

MANAGEMENT

20. Management requirements of the various kinds of fisheries in the Southwest Indian Ocean, i.e., the artisanal fisheries, trawl, shrimp and other industrial fisheries, the tuna fisheries, are basically different and should thus be reviewed separately.

21. Artisanal fisheries predominate in the area and this situation is bound to continue for a long time. The problems of managing these fisheries are very similar in all countries of the region and, therefore, would benefit from regional cooperation. Generally speaking, these fisheries are poorly known: the main species on which they are based; their rate of exploitation; their economic status; the income they provide to fishermen are seldom properly appreciated. The first task would be to identify those fisheries which are carried out on fully or overexploited resources. Several coral reef fisheries are known or suspected to be in such state. In such situations, resources which could offer opportunities for further development and for diversion of excessive effort need to be identified and actions to promote such development should be formulated. Conversely, steps should be taken to prevent increased effort on already fully exploited stocks.

22. At the same time, systems for regulating fishing effort and its distribution over the available resources in artisanal fisheries in general should be investigated and tested. Because of the common property nature of fisheries at the national level and the present freedom of entry, the long term economic and social improvement of artisanal fisheries will regime the formulation and enforcement of schemes for limiting the amount of catches, the fishing capacities and the size of the fishing community depending upon each unit fishery. Little experience is yet available on the best approaches and systems for artisanal fisheries. It will be a long term task to have appropriate solutions developed, accepted and applied. Therefore, this type of problem should be given priority attention.

1/ Reports on a mission to assess requirements and to recommend an action programme for a national fishing technology unit for Tanzania and Kenya (mission carried out in December 1979; reports published in May and July 1980 respectively)

23. The allocation of the resources between the artisanal, inshore fisheries and the industrial fisheries and the application of adequate systems of control are likely to raise serious issues in the Southwest Indian Ocean, as in other regions of the world. Management decisions are difficult to arrive at because, independant of their political implications, the social and economic aspects of the fisheries in competition, their respective prospects and the effects of the various possible decisions, including that of no action, are poorly understood.

24. In several areas, trade in ornamental fish and shellfish, which are commonly found in inshore waters, has resulted in excessive rates of exploitation. The harvesting of such species should be controlled and managed. Also, some countries have established marine parks for recreational purposes, for protecting certain areas from excessive fishing and for rebuilding the stocks. The management of marine parks, their possible role for resource investigations and evaluation (e.g., for comparison of unfished biomass with exploited ones) need also to be further investigated.

25. The management of industrial fisheries, particularly trawl fisheries for shrimp and finfish, is a problem common to several of the countries of the Southwest Indian Ocean. Some shrimp fisheries, once economically prosperous, are today in a difficult economic situation through lack of management. Their recovery depends on the adoption and effective application of management measures, among which the regulation of fishing effort and fishing capacity is the most important but also the most difficult to design and implement. Mesh size limitation also would be beneficial to several trawl fisheries. This requires further economic and biological investigations to see how to effectively exploit the multi- and interrelated species resources on which they are based. Cooperation with national fishery administrations to develop measures which the later can effectively enforce, is also needed.

26. The management of shared stocks, of which tuna is the major example in the region, raises specific issues inasmuch as the activities of any one fishing nation not only affect its own future yields and catch rates but also those of the other countries participating in the same fishery. To formulate proper management schemes and negotiate adequate agreements for the sharing of the catch or of the wealth generated by the fishery, the countries concerned should pool the information on their catches and fishing operations, including, if applicable, that of their foreign partners and collaborate in the joint assessment of the stocks.

27. The development and management of oceanic tuna also raises additional problems for coastal countries wanting to increase the economic revenue they could draw from the fish concentrations available within the respective exclusive economic zones. The active participation of developing countries in the catching and marketing of those resources still faces the same difficulties which have largely prevented them in the past from entering in this fishery. However, the new situation obviously opens new tuna fishing opportunities for coastal and island countries in the Southwest Indian Ocean. Some countries, such as Mauritius and the Seychelles, have decided, as did Madagascar some years ago, to participate directly through the establishment of joint ventures.

28. Others might initially find more appropriate to allow foreign vessels to operate in the waters under their jurisdiction against the payment of license fees or any other mutually acceptable arrangements. Coastal and island countries would benefit from cooperating in the assessment of options available for increasing the benefits they could draw from the tuna fisheries, including the determination of the amount of fees they could charge to foreign boats and the formulation of schemes for facilitating their extraction. More generally, all coastal countries and fishing nations should collaborate in the monitoring of the stocks and the determination and enforcement of appropriate management measures.

29. The control and surveillance of foreign fishing operations over the national EEZs raises, especially in tuna fisheries which are distributed over extensive sea areas, special difficulties which have to be analyzed, preferably jointly, to develop cost effective management and surveillance schemes.

30. The IOFC Tuna Management Committee already offers coastal countries and tuna fishing nations a mechanism for collaboration in the compilation of relevant fishery statistics, the joint assessment of the stocks and, if they so desire, to facilitate discussions and negotiations on their management. Plans are already well advanced to initiate a project for the management of tuna in the Indian Ocean and West Pacific Ocean, the purpose of which is to assist the Committee and its member countries in establishing and maintaining a comprehensive data centre; in promoting work in resource assessment work and economic analysis of development options (including the extraction of fees) and of alternative management schemes and in providing its member countries technical assistance and advice on these subjects.

FISHERY ADMINISTRATION, STATISTICS AND TRAINING

31. Detailed data on the administrative and technical capabilities are not available to FAO for all countries in the region. The following information is given to illustrate the general situation in the region. A brief survey of marine fishery administrations revealed that Madagascar has a total of 24 professional officers recruited from the animal husbandry service, of which only a few have specific training in marine fisheries. Of these, two have university level qualifications (animal husbandry engineers) while the others are technical assistants.

32. In Somalia a recent study indicates that the professional and medium-level staff in the Ministry of Fisheries is about 25 persons, of which six have university level qualifications (five of whom are in the Research Division). Five others graduated from the Marine and Fisheries Institute of Mogadishu, while the rest have secondary or primary school education.

33. In Mauritius the Fisheries Department has eight professionals dealing with marine fisheries.

34. In Kenya the Fisheries Department which was under the Ministry of Tourism and Wildlife has recently been placed under a newly created Ministry of Environment and Natural Resources. The total staff (both inland and marine) is about 400, half of which are fishery assistants and fish scouts concerned with statistics, enforcement and extension. Officers concerned with marine fisheries are further divided between the Marine Fishery Research Institute and the Fisheries Department. Senior positions are held by graduate fisheries officers, chiefly biologists who are assisted by non-graduate fishery development officers. Many of the fishery officers have attended the UK Fishery Officer Course.

35. This brief and incomplete survey shows that existing administrative capabilities are not particularly strong in the countries of the region. Few countries possess the variety of expertise required to effectively cover the various aspects of fishery development planning and management. Consultations beteen national officers would speed up the identification of common problems and approaches on how to improve the government role in upgrading national fisheries. At regional level, in addition to seminars and workshops, training courses could be organized to train Senior Fishery administrators and experts in fishery development, planning and management and assistance in the form of training material, consultants could be provided for the training of medium-level officers and fishermen.

36. As has been already noted, the collection of fishery statistics is essential for all aspects of future development and management. Under the auspices of IOP[1/] and national projects, several experts have provided assistance in designing and introducing efficient statistical systems. This is particularly important because the designing of statistically sound systems presents technical difficulties in small-scale fisheries. When such systems are established, adequate staff, in particular field enumerators, are required for their maintenance.

1/ IOP = International Indian Ocean Fishery Survey and Development Programme

37. A regional approach for the development and standardization of national statistical systems would be extremely productive. The services of a regional fishery statistician is recommended to assist member countries in upgrading their sampling schemes and in training their personnel in data collection processing and analysis, as well as assisting in the development of a regional statistical system.

38. Collection of statistics should not be limited to catch data. Catch effort data and length frequency measurements are also required for stock assessment purposes (see paragraph 10). Economic and social statistics, e.g., on the number and characteristics of fishing boats, number of fishermen, fish prices, costs of fishing and processing, etc., are also needed as a base for planning the development of fisheries, including analysis of development options, of possible schemes for resource allocation and for the analysis of alternative management schemes.

39. Training needs in the region are considerable. A few figures well suffice to illustrate this point. The Marine and Fisheries Institute in Mogadishu (Somalia) produced about 47 fourth-year students in 1978/79 and 66 in 1979/80 (general fisheries and marine mechanics). Manpower needs for the Somali fishing industry have been recently studied and estimated as: 4 Fisheries Officers; 47 Engineers; 50 Mechanics; 13 Technologists; 13 Trawler Skippers; 50 Fishing Assistants; 30 Boat Repairers; 14 Ice-Plant Operators; 500 Small Motorized Boat Skippers; 25 Boat Skippers, 25 Bookkeepers; 25 Storemen, etc. These figures illustrate the wide gap between present needs and outputs.

40. It is true that Somalia presents a special case but, nevertheless, the development of training programmes to rapidly increase national and regional research and development capabilities in the Southwest Indian Ocean has been stated as a priority by all coastal countries. The requirements for manpower development and the training facilities available in the area should be systematically reviewed as a basis for planning future regional and national training programmes.

41. When planning future training activities, a distinction has to be made between those which can be carried out at national level, e.g., the training of fishermen, mechanics, skippers, extension workers, etc., and activities which can best be done regionally because the national needs, although essential in qualitative terms, are not sufficiently important in absolute terms to justify the permanent establishment at national level of training programmes in specialized fields (statistics, resource evaluation, including surveys, fishing technology, boat building, fish handling and processing, fishery development planning and mangement, etc.).

42. Within the region permanent schools for the training of fishermen (including skippers and engineers) and extension workers are found at:

Location	Disciplines taught
Majunga, Madagascar	
Mogadishu, Somalia	skippers, engineers
Kunduchi, Tanzania	extension workers
Mbegani, Tanzania	boat building, fishermen
Maputo, Mozambique	skippers and mechanics (certificates not yet recognized)

43. The European Economic Community, together with UNDP and French bilateral assistance (FAC), have been asked to provide assistance to Madagascar's marine training school in view of its regionalization. The Seychelles Government has supported the request from the Malagasy Government to the European Commission. The school presently has about 10 Malagasian students and five Seychellois students (masterfishermen and/or mechanic engineers) of medium level. It has no high-level fish processing students. All the other students (65) are not concerned with fisheries but with merchant marine. The school would eventually also have a versatile training vessel of approximately 25 m for about 15 students, two teachers and basic crew. Several of the above mentioned centres/schools are or were assisted for some time by multi- or bilateral projects. These schools are not always suitable for training at medium or higher technical levels in specific fields (e.g., mechanics, electronics, etc.) and satisfactory solutions may require some regional or international arrangements.

44. As important for the region is the education of technical assistants and enumerators, i.e., of those who will do most of the actual field work and data collection. Their training has often been neglected, while their present numbers are far too small to cover the needs adequately.

45. National capabilities in fishery biology and resource evaluation throughout the region are generally inadequate. A number of universities in the region offer courses in fields relevant to marine science, but the number of experienced scientists directly involved in fisheries investigations is still insufficient to carry out the fishery research investigations needed and provide guidance to young graduates in specific fishery research. High level training at universities or through fellowships abroad will continue to be necessary. Regular contact with experienced experts and teams, through fellowships either on board research vessels or through training courses and workshops, has already contributed to increase the level of national competence and the interest of biologists in fisheries biology. However, there is still a long way to go before each country will have a core staff sufficiently well-trained to satisfy its own development and management needs. Also, the economic importance of the national fishery sectors will not always justify the recruitment of experts in all the desirable aspects of fishery science and technology.

46. Economies of scale could be achieved by strengthening regional cooperation for training in the various fields of fisheries. Different approaches should be considered, the respective values of which need to be assessed case by case. For example, some specialization and harmonization of national programmes could be considered for training in the basic topics of fishery science and technology. Various national training institutions would in that way be asked to play a regional role. In highly specialized fields for which no training facilities are available in the region, short-term training courses could be periodically organized at regional level. Fellowships and scholarships in foreign academic and research institutions will also be needed.

47. The Regional Project for the Development and Management of Fisheries in the Southwest Indian Ocean could play a leading role in assisting member countries in developing their training programmes and facilities and organizing training courses in specialized fields such as fishery statistics, stock assessment, fishery development planning and management, boat building, fishing technology, fish processing and handling, etc.

CONCLUSIONS

48. Document IOFC:DM/SW/81/4 highlights those areas where priority attention must be given to accelerate fishery development and management in the region. Discussions emanating from the present document should aim at defining more precisely the roles of the member governments, the regional programme and FAO.

49. Schematically, a regional programme such as the Project for the Development and Management of Fisheries in the Southwest Indian Ocean, could assist member countries in three major aspects:

(i) the monitoring, assessment and management of shared stocks;

(ii) promoting regional cooperation through the harmonization of national programmes, the exchange of views and experiences, the organization of joint activities (investigations at sea, seminars and workshops, training, etc.), the examination of common national fishery development and management issues and, more generally in the promotion and technical backstopping of technical cooperation among member countries (TCDC);

(iii) the provision of short term, highly specialized technical assistance to member countries (consultants, project staff).

Whereas, with the exception of tunas and some other stocks, the fisheries based on shared stocks are relatively limited in the region, it seems that there are substantial opportunities for strengthening regional cooperation.

SUGGESTED ACTION BY THE COMMITTEE

50. The Committee is invited to:

(i) indicate the activities which should receive priority attention for accelerating fishery development and management in the region;

(ii) express its views regarding the role that a regional field programme could play to assist member countries in these fields and indicate the activities that such a programme should consider in priority;

(iii) indicate those activities which should be treated with priority by FAO and the countries themselves.

51. In doing so, the Committee could take into account the following list which has been made on the basis of the review presented in this document:

Resource Evaluation

(i) improvement of national statistical schemes and development of a regional statistical system (paragraphs 10, 36, 37 and 38);

(ii) joint review of the region's fishery resources, through exchange of data and information, organization of working parties, organization of joint surveys (paragraphs 12 and 13);

(iii) training activities;

(iv) coordination of national research programmes;

(v) direct provision of advice to member governments on development opportunities and management requirements.

Development

(i) provision of technical advice for the setting up of fishing and fish technology units (paragraph 17);

(ii) similar services for the upgrading of national extension services, fishermen training, credit schemes, etc. (paragraph 17);

(iii) similar services on technological aspects of fishery development (fish and fishing technology) (paragraph 16);

(iv) similar services for the formulation of technical assistance and investment projects (paragraph 17);

(v) economic analyses of development opportunities and options.

Management

(i) joint analysis of regulatory measures (mesh size limitations, regulation of fishing effort, etc.) for the various region's fisheries (artisanal, coral reef, trawl, shrimp, tuna, etc.), and if required, formulation of measures for shared stocks (paragraph 22);

(ii) studies on economic approaches of management (paragraph 25);

(iii) analysed options for the extraction of maximum economic revenues from foreign fleets (paragraphs 27 and 28);

(iv) provision of advice on possible schemes for monitoring and surveillance, joint ventures, fishery legislation, etc. (paragraphs 25 and 26);

(v) organization of short-term training activities (e.g., regional training courses in fishery development planning and management) (paragraphs 46 and 47).

M-43
ISBN 92-5-101097-8